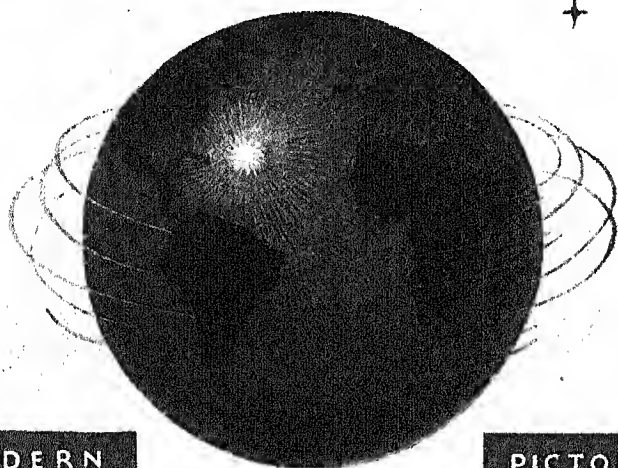


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Tt T, the twentieth letter in the English alphabet, derived from the twenty-second and last of the Phoenician alphabet. This was called the *tav*, or *mark*; it had practically the same value as the later Greek *tau* and the English *τ*, and was made much like a capital *T*, except that the vertical line extended through the crossbar. *T* is more closely related to *d* than to any other letter, and the two are often confused and used interchangeably in allied languages. In English, *t* has only one regular sound, but taken in connection with *i*, it is often pronounced like *sh*, providing another vowel follows the *i* in the same syllable, as in *partial*. The Anglo-Saxons, when they adopted the alphabet from the Romans, added two letters, one of which was called *thorn*, and had the sound of *th*. It was shaped very much like a capital *Y*, and probably because confusion arose from the likeness, the letter was later dropped, and the combination *th* was substituted for it. This digraph, as it is called, is pronounced in two ways—as in *think* or *breath*, and as in *their* or *breathe*.



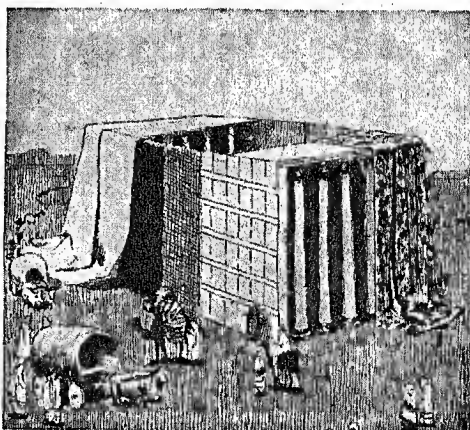
TABBY. See CAT (Cat Aristocrats).

TABERNACLE, *tab' ur nak'l*, OR **TENT OF MEETING**, the center of worship of the Israelites during their wanderings in the wilderness. Moses received instructions while on Mount Sinai for its erection (*Exodus* xxvi, 30), and the materials were provided by the free offerings of the people. It was dedicated on the first day of the second year after the Exodus from Egypt.

The tabernacle was forty-five feet long, fifteen feet wide, and fifteen feet high. Its framework was of acacia boards, overlaid with fine gold. The ceiling was of curtains of white linen, interwoven with blue, purple, and scarlet cherubim. Above this was a curtain of goats' hair, and outside of all a covering of skins. The interior was divided by the "veil," a curtain of linen similar to those of the ceiling, into the *Holy of Holies* and the *Holy Place*. The *Holy of Holies* contained the Ark of the Covenant, in which were kept the Tables of the Law, the pot of manna, and Aaron's rod that budded. Above the Ark was the "mercy seat," a cover of solid gold, surmounted by two golden cherubim. In the *Holy Place* were the table of shewbread, the altar of incense, and the golden candlestick.

The tabernacle stood within a court, 150 feet long and seventy-five feet wide, enclosed by rich curtains and supported by brass pillars.

It opened toward the east, and before it stood the altar of burnt offering, where the people brought their sacrifices to be offered by the



ERECTING THE TABERNACLE

[Drawn from illustration in *Story of the Bible*.]

priests. There was also a laver, where the priests washed their hands and feet, before entering the *Holy Place*.

The tabernacle and its furnishings were so constructed as to be easily portable. It was in the care of the Levites, who camped round

about it. Above it hovered the pillar of cloud by day and the pillar of fire by night; these were the signs of Jehovah's presence. After the conquest of Canaan, the tabernacle was set up at Shiloh, and afterward removed to Nob and then to Gibeon. From the latter place, it was brought to Jerusalem at the time of the dedication of Solomon's Temple, probably being preserved as a relic within the Temple walls. See TEMPLE.

In the Roman Church, the tabernacle is the receptacle in which the consecrated elements are kept.

TABERNACLES, FEAST OF, an autumn festival of the Hebrews of Biblical days, beginning on the fifteenth day of the eleventh month (*Tishri*). It lasted seven days, during which the people lived in booths, in commemoration of the time when their forefathers dwelt in tents in the wilderness. It also celebrated the ingathering of the harvest (*Deut. xvi, 13*). The dedication of the Temple by Solomon was held at the time of the Feast of Tabernacles (*I Kings viii, 65*), its length, on this occasion, being extended seven days. After the Exile, a number of rites were added, such as the ceremony of the waving of palms and the libation of water. As at the Feast of Weeks and the Passover, all males are required to be present at the sanctuary during this festival. Following the final destruction of the Temple, the rabbis ordered that the celebration of the feast must be continued at the individual synagogues, and it is thus observed by the Jews to the present day.

TABLE MOUNTAIN. See CAPE TOWN (City); COLORADO (The Geology of Colorado).

TABLE TENNIS. See PING-PONG.

TABLOID NEWSPAPERS. See NEWSPAPER (Historical: Tabloid Newspapers).

TABOO, *ta boo'* also spelled TABU, a word of Polynesian derivation which has made its way into the current speech of civilized peoples, by whom it is employed with much the same meaning as *forbid*, *exclude*, or *ostracize*. It may be a noun, verb, or adjective, as:

A taboo is placed on profanity among the Boy Scouts.

The legislature will taboo any member accepting a bribe.

Coarse manners are taboo.

The practice of taboo among the Polynesians and various other primitive peoples consists in setting apart certain objects as unclean or sacred, or as having the power to injure. Such objects must not be touched. This custom prevails among tribes in America, Africa, Central Asia, and India, and has a counterpart in certain religious practices of the Greeks, Romans, and Jews.

Taboo takes various forms. There are taboos of foreigners, of innovations, of burial grounds,

of parts of one's person, of objects set apart for kings, chiefs, and priests, of sick persons, of sorcerers, and so on, indefinitely. Taboo objects are marked by various methods, such as using a piece of white cloth, a stick with dry leaves, or a bundle of branches painted red and white. The numerous restrictions imposed by the old Hebrew law in regard to sacred and unclean things were, in effect, examples of taboo.

TABOR, *ta' bur*, MOUNT, a mountain of Northern Palestine, which is conspicuous by reason of its isolation, rather than because of its size. Rising abruptly to a height of about 1,000 feet above the plain of Esdraelon, it stands, a wooded, shapely cone, a landmark through all Galilee. Its slopes are covered by groves and thickets of oak, walnut, and roses.

The Old Testament refers to Tabor as the site of a sanctuary, and as the place to which Barak summoned his forces for the desperate conflict with Sisera (*Judges iv*). Though it was but seven miles from Nazareth, the boyhood home of Jesus, the New Testament makes no mention of it. The early Christians looked upon it as the mount of Christ's transfiguration, and built upon it churches and monasteries, but research has proved that, during all the period of Christ's life, and for centuries before, a fortified town occupied the summit.

TABRIZ, *tah breez'*. See PERSIA (The Cities).

TABU. See TABOO.

TABULARIUM. See CAPITOL.

TACAMAHAC. See POPLAR.

TACHÉ, *tah sha'*, SIR ETIENNE PASCAL (1795-1865), a Canadian statesman, twice Premier of Canada and chairman of the Quebec Conference, at which the terms of Confederation were agreed upon. Taché was born at Saint Thomas, Que. When a boy he enlisted in the Canadian militia, and served throughout the War of 1812. At its close he studied medicine, and in 1819 was admitted to practice. He remained in active practice until 1841, when he entered the Canadian Assembly. He resigned in 1846 to become deputy adjutant general of the Canadian militia, but in 1848 again entered the Assembly, and in March of that year became Commissioner of Public Works. From 1849 to 1851, and again from 1852 to 1856, he was Receiver-General. In the latter year, he was appointed speaker and a life member of the Legislative Council, and by the end of the year he became Premier in the first Taché-Macdonald Ministry. In 1864 Taché and Sir John Macdonald again formed a Ministry with the former as Premier, but in both Ministries Macdonald was the real head of the government. Taché was knighted in 1858.

TACHOMETER, *tah om' e tur*. See AIRCRAFT (Safety Devices).

TACHYLYTE, *tah' ik lite*, the glassy variety of basic igneous rock, such as basalt. Tachy-

lytes are black, but in the thinnest sections appear brown and partially transparent, owing to the presence of bits of magnetite. They are readily susceptible to weathering. In the Hawaiian Islands, there are great masses of tachylytes, constituting lava flows of the volcanoes. More commonly, however, tachylytes occur in the form of a chilled edge to thin dikes of basalt or dolerite. The Tertiary igneous rocks of the Scottish Western Isles are largely of this type.

TACITUS, *tas' ih tus*, **PUBLIUS CORNELIUS** (about 55-about 120), a Roman historian, one of the world's greatest. Of his life, nothing is known except what may be learned from his occasional references to himself, and from a series of letters written to him by his intimate friend, the younger Pliny. Eleven of Pliny's letters now extant are addressed to Tacitus. These sources tell us only that he held various public offices under Vespasian, Titus, Domitian, and Nerva, that he won a reputation as an orator and lawyer, and that he married the daughter of Gnaeus Julius Agricola. His alliance with this distinguished soldier and statesman probably had an influence in procuring his various promotions in office.

What He Wrote. Of the writings of Tacitus there remain the following: a discussion of eloquence, *Dialogue on Orators*, his first work, published early in life, and by some critics believed not to be genuine because it contains few of the distinctive mannerisms of Tacitus; the *Life of Agricola*, a biography of his father-in-law, universally acknowledged to be a masterpiece; the *Germania*, a description of the institutions and customs of the various German tribes, written, it has been thought, to serve a political purpose, by calling the attention of the Romans to the possible danger from these neighbors; the *Histories*, of which there remain only the first four books and a part of the fifth, giving an account of the years 69-70; and the *Annals*, which originally consisted of sixteen books, giving the history of Rome and its provinces from the death of Augustus to that of Nero. Of these *Annals*, books seven to ten inclusive, with parts of others, are lost. W.L.C.

TACKING. See **SAILBOAT** and **SAILING**.

TACKLE. See **BLOCK** and **TACKLE**.

TACNA-ARICA, *tahk' nah ah re' kah*, **AWARD.** Tacna-Arica is a small region about the size of New Hampshire, located about midway along the western coast of South America, and for nearly half a century the object of quarrels and strained relations between Peru and Chile. Practically a desert with few natural resources, the area was under the sovereignty of Peru. About 1875, nitrate, guano, and other minerals began to be exploited in the Bolivian provinces just south of Tacna-Arica. These provinces, Antofagasta and Tarapaca, became very attractive to Chile, and, with the obvious purpose of securing possession of their valuable resources, in 1879 Chile instigated a war with Peru and Bolivia.

Victorious, Chile took over the nitrate fields, and, in order to extend its coast a little farther north, for "political, economic, and strategical reasons" offered to purchase Tacna-Arica from Peru. However, mindful that Chile had deprived Bolivia of a corridor to the sea, and fearing further encroachments on the part of Chile, Peru refused to sell, and Chile took the territory by force.

A quarrel of several years' duration followed, and in 1883 the Treaty of Ancón was signed, which allowed Chile to hold Tacna-Arica for ten years; at the end of this time, a plebiscite, or vote, was to be held, to determine the final disposition of the province. However, Chile was reluctant to risk a plebiscite in a territory originally Peruvian, and, though attempts were made to take a vote, neither side could agree on the terms or conditions, and the relations between the two countries became increasingly bitter.

In 1922 the two countries sought the aid of the United States as arbitrator, and representatives were sent to Washington. In 1925 it was decided that the long-overdue plebiscite should be held, and the difficult problem of the machinery for the vote was entrusted to a plebiscitary commission, consisting of a Peruvian, a Chilean, and an American. The commission met in Arica, but all its work was defeated, because of disagreements between the two countries.

Late in 1926, the United States again offered its services as friendly adviser, and Secretary of State Kellogg, not discouraged, worked eagerly and conscientiously to effect a settlement. When the Pan-American Conference met at Havana, in 1928, Secretary Kellogg succeeded in persuading Chile and Peru to resume diplomatic relations, that they might work out together a permanent solution to the problem; and, at the same time, he assured them of the friendly service of the United States. In May, 1929, the final settlement was announced, the main provisions of which were as follows: Chile retained Arica and Peru took Tacna; Chile was required to build, for Peru, a wharf, a customhouse at the Bay of Arica, and a station for the railroad from Tacna to Arica; Chile must deliver to Peru the sum of \$6,000,000, besides all the public works already constructed in Tacna; and private property legally acquired in the territories was to be respected by Chile and Peru. A monument will be erected jointly by the governments of Chile and Peru, to commemorate the consolidation of their friendly relations. The transfer of Tacna province to Peru was formally made at midnight, August 28, 1929, thus closing the fifty-year controversy.

TACOMA, MOUNT, the name a portion of the people of Washington (state) apply to Mount Rainier. See **RAINIER, MOUNT**.



T The STORY of TACOMA

TACOMA, WASH., the county seat of Pierce County, is a seaport on Commencement Bay, an inlet of Puget Sound, and the center of an important lumber industry. It is in the west-central part of the state, twenty-eight miles south of Seattle and 160 miles north of Portland, Ore. The Puyallup River flows through the city and empties into the bay.

Tacoma occupies a picturesque site on uneven ground rising from the bay to a height of several hundred feet; the greater part of the city is built about 200 feet above the bay. On the west are the Olympic Mountains, and on the east the Cascades, both of which are ranges of snowy peaks and fir-covered slopes. Tacoma is the gateway to Mount Rainier National Park, fifty-six miles to the southeast, a region yearly attracting thousands of visitors. The city's scenic parks, its stadium seating 40,000,

and Fort Lewis, fifteen miles south, the largest permanent army cantonment in the United States, are features of particular interest. Population, 109,408 (1940).

Transportation. Tacoma is the western headquarters and terminus of the Northern Pacific and the Chicago, Milwaukee, Saint Paul & Pacific railroads. Two other transcontinental railways serve the city—the Great Northern and the Union Pacific systems. Motorbus lines lead to Rainier National Park, the ocean, and various points south and east. The city has steamship connections with world ports, and air services to all parts of the nation.

Industries and Trade. Extensive tracts of timber furnish the basis for Tacoma's most important industry—lumbering; it is particularly noted for its manufacture of plywood, doors, and furniture. Gold, copper, and silver ore are shipped from all parts of the world to the Tacoma smelter, which refines one twelfth of the world's copper. Great flour mills



Photo: Tacoma Chamber of Commerce

TACOMA AND SNOW-CAPPED MOUNT RAINIER IN MOUNT RAINIER NATIONAL PARK

consume the yield of a flourishing wheat section. There is an ample supply of electric power for industrial use in Tacoma, furnished by the three units of the municipally owned hydroelectric plant. In addition to its industrial plants, numbering more than 400, the city is a seaport whose ships trade with Europe and the Orient. Wheat, forest products, gold, copper, and silver ore, and fruit are among the chief articles of trade.

Institutions. Tacoma has the College of Puget Sound (Methodist Episcopal), the Annie Wright Seminary (Protestant Episcopal), and the Pacific Lutheran College. The city contains municipal and county hospitals as well as a veterans' hospital and hospitals for the Indians and the insane.

History. Old Tacoma, founded in 1868, and New Tacoma, founded in 1873, were consolidated on January 7, 1884, to form Tacoma. In 1910 the commission form of government was adopted. E.R.F.

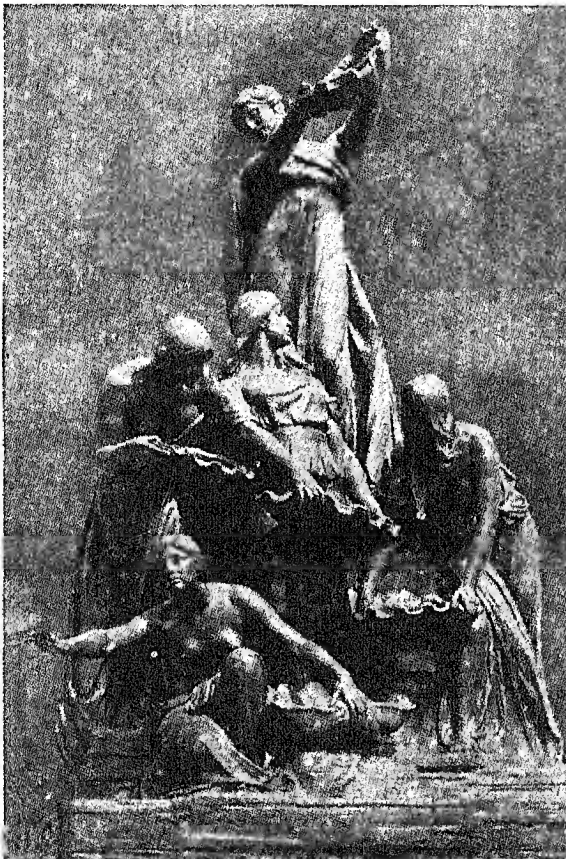
TACONIC, *ta-kon' ik*, **MOUNTAINS**, a low mountain ridge uniting the Green Mountains of Western Vermont with the Highlands of the Hudson, and forming part of the boundary between New York and Massachusetts (see **GREEN MOUNTAINS**). Equinox in Vermont (3,816 feet) and Greylock in Massachusetts (3,505 feet) are its highest peaks. Like other mountains in this region, the Taconic are attractive, green-covered heights with rounded summits.

TACTILE SENSE. See **TOUCH**.

TADMOR, See **SYRIA** (The Cities: Palmyra).

TADPOLE, a term commonly applied to the larva of an amphibian (such as frog, toad, and salamander), from the time it hatches from the egg until it takes on the characteristics of the mature animal. Properly, however, it is the name for the larva of a tailless amphibian (frog or toad), after it loses its external gills

and before the forelimbs appear and the tail is absorbed. A tadpole, scientifically speaking, is a creature with a round head so joined to the body that the two cannot be seen as separate parts, and with a distinct, flattened tail which serves as a swimming organ. See **FROG**; **TOAD** (illustration), page 7191. M.J.H.



"THE SPIRIT OF THE GREAT LAKES"
A sculpture by Lorado Taft. (See page 6998.)

TADZHIK **SOVIET SOCIALIST REPUBLIC**, in Central Asia, a member of the Soviet Union (Russia). It has an area of approximately 55,600 square miles and a population of 1,485,000 (1939), mainly Tadzhiks but also some Uzbeks, Turkomans, Kirghizes, and Russians. Cotton is an important crop. Industrial plants include silk, cotton, and flour mills; also leather factories. The capital is Stalinabad (population, 42,200). Khodjent (population, 50,900) is an important city. See **RUSSIA**. A.P.

TACL, *tal*, a coin in China. See **MONEY** (Foreign Monetary Standards).

TAFFETA, *taf'-e tah*, a plain, lustrous, closely woven, rather

stiff, but very smooth, silk fabric. The name is derived from a Persian word, *taftah*, meaning *spun* or *woven*. *Taffeta* was originally used as the name of all plain silks which were made simply by alternating the threads of the warp and the woof (see **WEAVING**). At different times, various qualities have been ascribed to taffeta; in the sixteenth century, it was "very thick and costly"; in the seventeenth, it was "very soft and thin"; and about 1750 it was described as a "lustrous silk, sometimes checkered or flowered, and sometimes striped with gold and silver."

Some of the cheaper grades of taffeta are weighted with chemicals and for that reason have a tendency to split. Chiffon taffeta is a

lighter, softer material of excellent quality. Besides the narrow widths made as ribbons, taffeta is made in widths of thirty-six, forty, and fifty-two inches, and is used for men's shirts, for draperies, and for dresses, especially where a bouffant effect is desired. A closely woven wool fabric, used for shirts and dresses, is called *wool taffeta*.

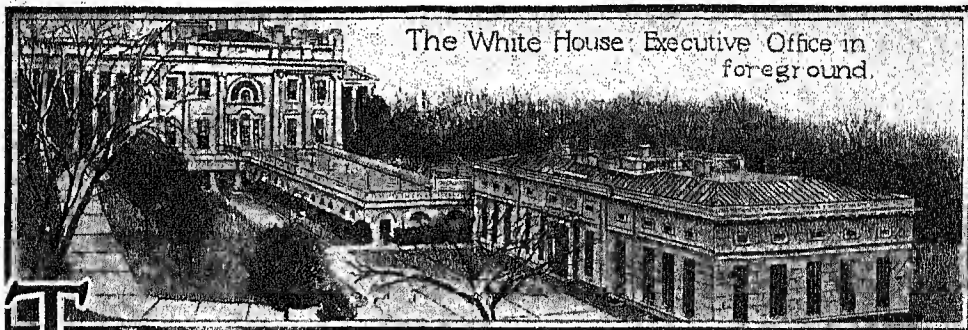
TAFFY WAS A WELSHMAN. See RHYMES OF CHILDHOOD.

TAFT, LORADO (1860-1936), an American sculptor, teacher, and lecturer on art subjects, whose genial personality, and clear and interesting way of presenting his subject, won him wide popularity as a public speaker. He was born at Elmwood, Ill., and was graduated at the University of Illinois in 1879. After completing an art course in Paris, at the School of Fine Arts, he established a studio in Chicago, which was his headquarters. In 1886 he became an instructor at the Chicago Art Institute, and in that capacity exercised a helpful influence over thousands of young people. In 1909 Taft was made professorial lecturer at the University of Chicago. After 1919 he was a non-resident professor of art at the University of Illinois, and each year he gave a series of illustrated

lectures which became increasingly popular.

His work represents a blending of the ideal and realistic tendencies in sculpture. One of his best-appreciated sculptures is a symbolic group called *The Spirit of the Great Lakes*, which has been set up on the south façade of the Art Institute (see illustration on the preceding page). He also designed a remarkable colossal *Fountain of Time* for Chicago's Midway Plaisance, a boulevard connecting Jackson and Washington parks. This group represents Time as a colossal form, reviewing the marching figures in the pageant of history, and is contrary to the common conception that Time is fleeting.

Other works include *Thatcher Fountain*, Denver; *Columbus Memorial Fountain*, at Washington, D. C.; *Washington Monument*, Seattle; *The Blind*, suggested by Maeterlinck's drama; *Solitude of the Soul*, Chicago; *Black Hawk*, Oregon, Ill.; and *Alma Mater*, a statue donated by him to the University of Illinois (1929), with contributions from the alumni (see page 7415). In 1936, his Lincoln and Douglas debate memorial was dedicated at Quincy, Ill. He wrote a *History of American Sculpture and Modern Tendencies in Sculpture*. See **BLACK HAWK**.



TAFT, WILLIAM HOWARD (1857-1930), an American jurist and statesman, the twenty-seventh President of the United States, and from 1921 to 1930, Chief Justice of the Supreme Court, a position he preferred above the Presidency, strange as the statement may appear. One unique distinction fell to him: He is the only man in the history of the United States who has been placed at the head of two of the three coordinate branches of the government.

It was the tragedy of President Taft's administration that it transformed him from one of the most popular of Americans to one who came to be misunderstood by a large number of the people. By temperament and training, Taft was a judge. The very traits which are most admirable in a judge—studious habits, deliberate decisions—were at times detrimental in a President when quick decisions and a keen grasp of new things were needed. As Presi-

dent, moreover, Taft lacked the personal picturesqueness of his predecessor, Roosevelt, with whom he was constantly compared, and often to his disadvantage. It is almost a tragedy sometimes for even a good man to follow one whom many people idolize.

After the lapse of years, the acts of the Taft administration seem less significant, and historians give more heed to its high aims and just motives, and to its real and great achievements. In the heat of political conflict, charges of bad faith and evil motives were so frequent that the essential fairness of the President's position was often lost to view. As with Grover Cleveland, so with William Howard Taft; the unpopularity of the moment later turned into lasting respect. He won the liking of all men, even political opponents.

Early Life. William Howard Taft was born on September 15, 1857, at Cincinnati, O. He was the son of Alphonso Taft and his second

wife, Louisa Torrey, both of whose ancestors joined the Massachusetts Bay Colony in the first half of the seventeenth century. Alphonso Taft was an able lawyer and a distinguished public servant. He first came into national prominence as a judge of the Cincinnati superior court, when he upheld the right of the local board of education to abolish the reading of the Bible in the common schools. Although this decision cost him the governorship of Ohio, it gave him a national reputation, which President Grant recognized when he made him Secretary of War (March, 1876) and then Attorney-General (May, 1876).

In 1874, after his graduation from the Woodward High School of his native city, young Taft entered Yale University. There he frankly set out to win honors for scholarship. It is noteworthy, however, that his attention to his studies did not keep him from becoming one of the most popular men in his class, and in his senior year he was elected to one of the exclusive, secret "senior societies," or clubs. At graduation he ranked second in a class of 121 men. Returning home, he studied at the Cincinnati Law School, and when he was graduated, in 1880, he shared first honors with one other.

Instead of entering immediately on the practice of his profession, the future President became law reporter for the Cincinnati *Times*, which was owned by his half-brother, Charles Phelps Taft (born 1843). As the son of Judge Alphonso Taft, and as the younger brother of one of the leading Cincinnati newspaper owners, he was, almost from the day of his admission to the bar, under the watchful eye of the local Republican party managers, but it was his demonstrated ability that brought him such rapid advancement that, at thirty, he ascended the bench as judge of the Ohio superior court. In the meantime, he had been assistant prosecutor of Hamilton County, collector of internal revenue, and assistant solicitor of Hamilton County. He was serving in the last office when Governor Foraker, in 1887, appointed him to fill a vacancy on the superior court. When Taft's term expired, he was reelected, but he resigned in 1890, when President Harrison appointed him Solicitor-General of the United States.

Thus, at the early age of thirty-three, Taft was second in command of the Federal Department of Justice. In this position he was given charge of the "Sayward case" before the United States Supreme Court. This was a test case brought by the Canadian government to determine the authority claimed by the United States over the seal fisheries in Bering Sea. Taft's brief was clear on every point, and convinced the court. Shortly afterward, he was called on to defend the McKinley Tariff Act, whose constitutionality was attacked, because

it had been passed by a quorum counted by the Speaker of the House of Representatives but not voting on the roll call. The Solicitor-General convinced the court of the constitutionality of the law, by pointing out the clause of the Constitution which provides that a minority in either House may "compel the attendance of absent members in such manner



Photo: U & U

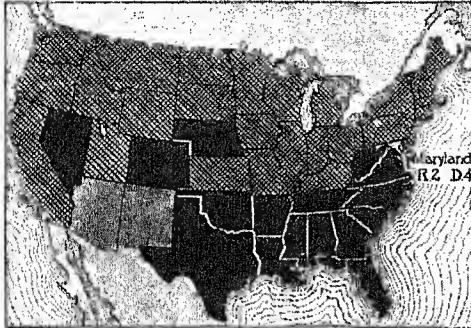
WILLIAM HOWARD TAFT

In the robe of a Justice of the Supreme Court. He became Chief Justice of that court after his term in the Presidency; he preferred that post above that of President of the United States.

and under such penalties" as it may provide; this clause would be worthless if the returned members could prevent a quorum by refusing to answer to their names. In both these cases, Taft's arguments won national attention.

On the Federal Bench. In 1892 President Harrison appointed Taft to the Federal bench as judge of the sixth circuit of the newly established Court of Appeals. During the eight years in which he sat on the bench, Judge Taft became a national figure, particularly for his decisions regarding railroads and organized labor. These decisions were noteworthy for the open-mindedness with which he dealt justice to both capital and labor. Perhaps the most important case which Judge Taft decided was one involving the Addyston Pipe & Steel Company. This was a suit by the Federal gov-

ernment to break up a monopoly in cast-iron pipe. In his opinion, Judge Taft reviewed the history of this typical trust, and showed that it was, in fact, a combination which aimed at and had succeeded in placing restraints on the trade in cast-iron pipe. The decision was all the more important because the case involved the three principal illegal features—restraint of trade in interstate commerce, conspiracy, and fraud—and also because it had been preceded by a number of cases in which the government



ELECTION MAP OF 1908

The states shown in black gave their electoral votes to Bryan, Democrat; in the shaded area, to Taft, Republican. The light areas were at the time non-voting territories.

had been defeated. Taft's opinion was so complete that the United States Supreme Court, when it refused to set aside the judgment, incorporated it bodily in the decree of affirmation. In 1894 Judge Taft granted an injunction against one F. W. Phelan, because the latter, as the agent of Eugene Debs, was endeavoring to tie up railroad traffic, and about the same time he delivered a decision declaring the secondary boycott illegal.

Governor of the Philippine Islands. In 1900, at the close of the Filipino insurrection, President McKinley appointed a civil commission, partly to investigate conditions and partly to govern the islands. Of this commission, Judge Taft, against his desires, was made chairman. With the four other members, he made a tour of the islands to learn their needs at first hand. As a result of this investigation, civil government was restored on July 4, 1901, and Judge Taft became the first civil governor. During the four years for which he held this office, he not only carried out the work he was sent to do, but made himself popular among both the natives and the American residents, and won a high reputation as a colonial administrator. After order was restored, Governor Taft introduced, one by one, minor civil courts in various parts of the island, a new system of land records, records of vital and social statistics, sanitary regulations, common schools with Americans as teachers, and many other im-

provements. One of the greatest achievements of his administration was the successful negotiation, with Pope Leo XIII, for the purchase of the friars' lands, vast tracts owned by the four Roman Catholic missionary orders established in the islands. In order to complete these negotiations, Governor Taft made a successful trip to Rome.

In the Cabinet. In 1903, in the midst of his work in the Philippines, Governor Taft was offered a place on the Supreme Court of the United States, a place he much desired. His reply to President Roosevelt reveals the heavy responsibility which rested on him, and, by inference, shows the vast influence he had won in the islands among the natives. It was as follows:

Great honor deeply appreciated, but must decline. Situation here most critical from economical standpoint. Change proposed would create much disappointment and lack of confidence among people.

A year later, however, he accepted the Secretaryship of War in President Roosevelt's Cabinet. Great progress had been made in the islands in the year, so that the change was less hazardous. As the islands, too, were under the direction of the Secretary of War, Taft's experience proved most valuable. Far from restricting his activities to office work, his new position widened his range. He was soon recognized as the spokesman of the administration, and represented it on many occasions. In 1906 he served temporarily as Governor of Cuba, after the intervention of the United States in the affairs of that infant republic. A year later, he visited the Panama Canal Zone, and established American government there. In the same year, he made a trip around the world, primarily for the purpose of attending the opening session of the Philippine Legislative Assembly. He also visited Japan and China, and diplomatically disposed of several problems which had caused complications in the relations of the United States with those countries.

Candidate for President. It was about this time that President Roosevelt let it become known that he favored the nomination of Taft in 1908 as the Republican candidate for President, and in the months immediately preceding the national convention, the President's influence was ardently thrown in favor of his Secretary of War. In a public statement, Taft had previously said:

... my ambition is not political; I am not seeking the Presidential nomination; I do not expect to be the Republican candidate.

Taft's own popularity, added to President Roosevelt's influence, easily gave him the nomination, by a vote of 702 out of 980 delegates, on the first ballot. His running mate was James

S. Sherman of New York, a well-known member of the House of Representatives. The Democratic candidate was William J. Bryan, already twice defeated. The campaign was not very exciting, and Taft and Sherman were

elected (November, 1908) by 321 electoral votes to 162 votes for Bryan and John W. Kern. The popular vote was 7,679,006 for Taft to 6,409,106 for Bryan—a Republican plurality of 1,269,900.

The Administration of William Howard Taft

The Payne-Aldrich Tariff Law. During the campaign and the months immediately following his election, President Taft was generally believed to be progressive. The fact that he had President Roosevelt's support was assumed as evidence that the Taft administration would proceed along the same lines of policy as had its predecessor. But such did not prove to be the case. After his inauguration, President Taft at once called Congress in special session to revise the tariff. The popular sentiment was unquestionably in favor of "revision downward," but the Payne-Aldrich law, as finally passed, made few important reductions and a considerable number of increases in duties. Even the President admitted that the law was too strongly protectionist, and that it did not comply with the spirit of the Republican platform, upon which he had been elected. He approved it, nevertheless.

Important Legislation. In view of its amazing political results, the Payne-Aldrich Tariff is perhaps the outstanding legislative feature of the administration. The administration should be judged, on the contrary, at least partly on the constructive measures passed. These included the establishment of the postal savings-bank system (1910) and the parcel post (1912); the organization of a Commerce Court and the enlargement of the powers of the Interstate Commerce Commission (1910); acts requiring publicity for campaign contributions for Federal elections; and acts providing civil government for Alaska and creating the Department of Labor. In 1912 Congress passed an act exempting American-owned ships from the payment of tolls for passage through the Panama Canal. This law caused foreign complications, and the exemption clause was repealed in 1914. Another interesting bill, which was vetoed by President Taft in 1912, provided a literacy test for immigrants.

Foreign Relations. For its achievements in diplomacy, the Taft administration ranks among the highest in the history of the United States. It was constantly facing difficult problems, and these were settled to the benefit of the United States. In 1909 the second American occupation of Cuba came to an end, and in the same year a long-standing dispute with Venezuela was submitted to the Hague Tribunal. Secretary Knox, in 1910, proposed to the various nations that the Hague Tribunal be made a permanent court of arbitration. At the same time, he was negotiating arbitration

treaties with France and Great Britain; these treaties were ratified by the Senate on March 7, 1912, but in such amended form that the President refused to submit them to the governments concerned. The year 1910 also witnessed the end of the fisheries dispute with Great Britain and the beginning of a quarrel with Russia. The latter country, by refusing to honor passports issued by the United States to naturalized Russian Jews, drove the President to abrogate the commercial treaty of 1832. Congress by resolution approved this course.

Reciprocity with Canada. One of the things on which President Taft had set his heart was the negotiation of a reciprocity treaty with Canada. An arrangement, popularly called the Taft-Fielding Treaty, was made, reducing the tariff duties on a list of commodities exchanged between the two countries. A bill incorporating these changes passed Congress in 1911, but in Canada reciprocity was defeated.

"Dollar Diplomacy." During the nineteenth century, it was customary for a nation to use diplomacy to advance its commercial interests. "Dollar diplomacy," as expounded and practiced by Secretary of State Philander C. Knox, was a reversal of this practice—it meant the use of trade and commerce to advance a nation's diplomatic prestige. A good example of this policy was the "six-power loan" to China. That country desired to enlist foreign capital. Secretary Knox did not wait for American bankers to ask for backing, but at once, in 1912, urged them to join with the European lenders, and thus secure for the United States a share in the influences working on the Chinese government.

Another example of "dollar diplomacy" was the treatment of Nicaragua and Honduras. In order to encourage American investment in the loans of these nations, the United States government obtained the right to collect taxes. The amounts collected could then be applied on the interest of the loans. "Dollar diplomacy," in few words, meant that the flag follows trade, instead of trade following the flag.

Mexican Affairs. Beginning in 1910, and continuing to the end of his term, President Taft's most serious foreign problems arose out of the disturbed conditions in Mexico. The revolution of 1910, led by Madero, resulted in the fall of Diaz, and the revolt of 1913, led by Huerta, caused the overthrow of the Madero government and the death of its chief. The

President was averse to intervention, but in an emergency, in the spring of 1911, he ordered 15,000 troops to protect the Mexican border. At the same time, he notified the Mexican government that intervention was not intended. With the Madero government the United States was on friendly terms, but President Taft, a month before the end of his term, refused to recognize the government of General Huerta, and thus left a difficult problem for his successor, Wilson.

Economic, Social, and Political Unrest. Not only in foreign affairs did President Taft's administration face serious complications. These four years, 1909-1913, are remarkable for social and political changes, some of which came suddenly, and some after years of discussion. Upheaval was apparent in many forms, in concrete changes as well as in thought. A general discontent with many political and economic conditions was evident throughout the country. The spread of prohibition and woman suffrage, the introduction of the direct primaries and the popular election of United States Senators, the extension of the initiative, referendum, and recall, the commission form of municipal government, the city manager, the frequent investigations into the affairs of trusts, the conservation movement, and, finally, the breach in the Republican party—these were all signs of the times.

Woman suffrage made tremendous strides between 1909 and 1913. Washington in 1910, California in 1911, Arizona, Kansas, and Oregon in 1912, were added to the list of states which granted full suffrage to women. These brought the total to twelve states at the end of the Taft administration. Another striking movement was the rapid spread of prohibition. As a matter of fact, only one state, West Virginia (in 1912), adopted prohibition while Taft was President, but that the movement was gathering force was revealed by the addition of five states to the "dry" column in 1914 and 1915, and by many additions to the local-option "dry" areas. One of the most significant political changes since the War of Secession was the adoption of the Seventeenth Amendment to the Constitution. It provided for the popular election of United States Senators. It was proposed in 1913, but did not become effective until after the expiration of Taft's term. Another great change was the Sixteenth Amendment, which was adopted in 1913, and authorized the levy of a direct Federal income tax. In a few years, this was to become one of the chief sources of the national revenue.

While the existing unrest thus expressed itself in certain concrete achievements, it was also revealed in a general tendency to investigate. Thus the President, by virtue of a clause in the Payne-Aldrich Act, appointed a tariff board of five members to study the making of

future tariffs. The board had no legal standing, and, unfortunately, much of its labor was wasted. Another great investigation was that conducted by the National Monetary Commission, headed by Senator Nelson W. Aldrich; out of its report grew the Federal Reserve Bank system.

The Anti-Trust Tendencies. But what will probably be longest remembered as the distinguishing feature of the Taft administration was its attitude toward the great trusts. The Attorney-General, George W. Wickersham, organized a bureau for the purpose of studying suspicious-appearing corporations and obtaining evidence against them. Suits at law and in equity were brought against about seventy trusts, including those which controlled the manufacture or distribution of sugar, beef, lumber, paper, window glass, bathtubs, wire, steel, harvesters, shoe machinery, and shipping. In 1911 the Supreme Court ordered the dissolution of the Standard Oil Company and the so-called "tobacco trust." All trusts were pursued with impartiality, with the result that more combinations were called in civil or criminal suits than had been attacked by all of Taft's predecessors since the passage of the Sherman Act, in 1890. At the same time, the spirit of the public was indicated by Congressional "investigations," none of which had results of lasting importance. The most conspicuous was the investigation of the "money trust," or the banking and financial interests. The facts disclosed were of value in framing the Federal Reserve Act and the Clayton Anti-Trust Act in the succeeding administration.

Ballinger-Pinchot Controversy. Almost at the outset of his term, President Taft identified himself, perhaps unwillingly, with the extreme conservative Republicans as against the progressive element. In the Ballinger-Pinchot dispute, he sided with his Secretary of the Interior, Richard A. Ballinger, and dismissed Gifford Pinchot from office. Pinchot had charged that the Interior Department had encouraged illegal entries for Alaskan coal lands, and in other ways had abandoned the policy of conservation of natural resources, as begun in the Roosevelt administration. Technically, Pinchot was guilty of insubordination, for which he was dismissed, but the fact that the evidence against Ballinger was strong might have justified the President in taking some other course. He, however, stood by the Secretary, who was ultimately exonerated by a Congressional committee.

The Breach in the Republican Party. During the Roosevelt administration, there had arisen a fairly sharp distinction between the conservative and the progressive elements in the Republican party. The latter generally had the support of the President, and when Taft took office on Roosevelt's recommenda-

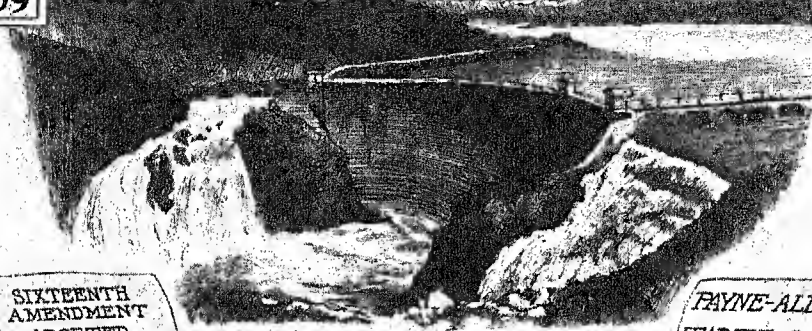
TAFT'S ADMINISTRATION

1909

1913

SIXTEENTH
AMENDMENT
ADOPTED
PROVIDING FOR
INCOME TAX

SEVENTEENTH
AMENDMENT
PROPOSED FOR
DIRECT ELECTION
OF SENATORS




Roosevelt Dam Completed

PAYNE-ALDRICH
TARIFF LAW
PROTECTIVE TARIFF

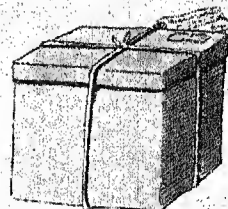
1909



Two New States Admitted



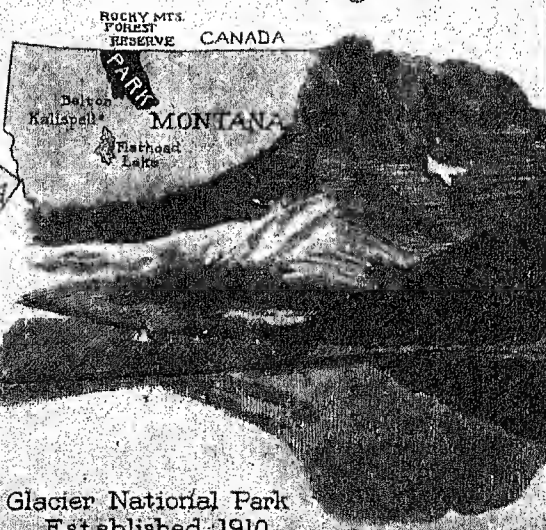
Emblem of
National Progressive
Party.
Organized 1912



Parcel Post
Organized 1913



Five More
States Adopt
Woman Suffrage



Glacier National Park
Established 1910

tion, it was assumed that he would continue Roosevelt's policies. By his defense of the Payne-Aldrich Tariff Act, however, President Taft immediately alienated the progressive Republicans. The two factions were further divided by the more or less openly avowed sympathy of Roosevelt with the insurgents, on his return from Africa. The breach between the two factions led to a Democratic victory in the Congressional elections of 1910, and gave the Democrats control of the House of Representatives. The Democrats, aided from time to time by the insurgent Republicans, carried tariff measures lowering the duties in several special schedules, and passed other laws of a "radical" nature, all of which were vetoed by the President.

The factional disputes among the Republicans continued until they became centered on the Presidential nomination for 1912. At first there were two leading candidates, Taft, as the candidate of the conservatives, and Senator La Follette, as the representative of the progressives. La Follette, however, was compelled for a time by illness to cease active campaigning. At this juncture, ex-President Roosevelt, at the invitation of the governors of seven states in which the "insurgents" were particularly strong, announced himself as a candidate for the nomination. At first dignified, the contest later became a warfare of personalities, with charges and countercharges freely hurled.

The Republican national convention, meeting in June at Chicago, was controlled by the Taft delegates. It was a scene of turmoil from the first day, the Roosevelt spokesmen contesting the admission of many of the Taft delegates. Most of the protests were ignored, and the Taft delegates were seated. The Roosevelt leaders resisted, and declared that the nomination rightfully belonged to their leader. Defeated on every point by the rulings of the national committee and the chairman of the convention, Elihu Root, the Roosevelt delegates refused to take part in the proceedings of the convention. On its last day, they held a mass meeting and nominated Theodore Roosevelt by acclamation as the candidate of a new Progressive party. In August a formal convention ratified the nomination and completed the organization of the party.

The campaign thus became three-cornered, for the Democrats, in the meantime, had nominated Governor Woodrow Wilson of New Jersey. The defection of the Progressives split the Republican party in two, and practically insured the election of Wilson. The chief features of the campaign were the attacks of the Republicans and Democrats against Roosevelt, and the latter's emphatic replies. In October, while the campaign was at its height, Roosevelt was shot by an irresponsible man in Milwaukee, and was compelled to cease active

campaigning. The election gave Taft only eight electoral votes, those of Vermont and Utah, against eighty-eight for Roosevelt and 435 for Wilson. The popular vote was 6,286,214 for Wilson, 4,126,020 for Roosevelt, and 3,483,922 for Taft.

Other Events. Two states, Arizona and New Mexico, were admitted during this term, both in 1912. The admission of these was delayed for months because the President vetoed the joint resolution for their admission. He disapproved a provision in the Arizona constitution for the recall of judges, and it was not until that provision was eliminated that he signed the proclamation of admission. The completion and dedication of the Roosevelt Dam in Arizona constituted an event of national interest. In New York, in 1909, was held the Hudson-Fulton Celebration to commemorate the three-hundredth anniversary of the discovery of the Hudson River and the centennial of Fulton's *Clermont*, the first steamboat. Another great public playground, Glacier National Park, was opened in 1910.

An Honored Ex-President. In the last months of President Taft's administration, public confidence in him seemed to be more or less restored. He took his defeat for reelection with a calm which was characteristic of him. On his retirement from office, he accepted the Kent professorship of law at Yale University, and in the same year was elected president of the American Bar Association. He continued to speak on questions of the day, and was on several occasions a severe critic of President Wilson's foreign policy. In 1916 he became chairman of the central committee of the American Red Cross.

In 1917 Taft did much to uphold the Wilson administration in its war preparations. He was chosen president of the American branch of the League to Enforce Peace, an organization whose object was to prevent, or at least reduce, the possibility of war, by threatening to use the combined economic and military strength of the nations of the League against any nation which should make war without first trying negotiation and conciliation. The office of Chief Justice of the Supreme Court, to which President Harding appointed Taft in 1921, was a fitting climax to an already illustrious career. He died March 8, 1930, and was buried at Arlington National Cemetery. E.D.F.

In Literature. Though not as facile with his pen as Theodore Roosevelt, Taft was a writer of distinction on political and economic subjects. He wrote *Four Aspects of Civic Duty*; *The United States and Peace*; *Popular Government*; *Ethics in Service*; *The Presidency: Its Duties, Opportunities and Limitations*; *Taft Papers on League of Nations*; and other volumes.

Helen Herron Taft (1861-), daughter of Judge John W. Herron of Cincinnati. Before her marriage, in 1886, Helen Herron was a talented musician; she was a founder of the Cincinnati Orchestra. All of

OUTLINE AND QUESTIONS ON WILLIAM HOWARD TAFT

Outline

I. Preparatory Years

- (1) Birth and family
 - (a) Father a distinguished jurist
- (2) Education
 - (a) College aims
 - (b) Law study
- (3) Early legal practice

II. Public Life

- (1) State judiciary offices
- (2) As United States Solicitor-General
 - (a) Important cases
- (3) On Federal bench
 - (a) Important cases involving capital and labor
- (4) As governor of the Philippines
 - (a) Excellence as administrator
 - (b) Introduction of reforms
- (5) As Secretary of War
 - (a) Spokesman of the administration
- (6) Election to Presidency
- (7) Yale Professor
- (8) Chief Justice

III. Administration

- (1) Domestic affairs
 - (a) Payne-Aldrich Tariff Law
 - 1. Dissatisfaction
 - 2. Political results
 - (b) Establishment of postal savings bank

- (c) Parcel post established
- (d) Organization of Commerce Court
- (e) Prosecution, under Anti-Trust Law
 - 1. Dissolution of Standard Oil Company

- (2) Foreign relations
 - (a) Occupation of Cuba ended
 - (b) Venezuela dispute submitted to Hague tribunal
 - (c) Fisheries dispute with Great Britain
 - (d) Commercial treaty with Russia abrogated
 - (e) Canadian reciprocity question
 - (f) "Dollar diplomacy"
 - (g) Mexican trouble
- (3) Internal and local affairs
 - (a) Spread of prohibition and woman suffrage
 - (b) Ballinger-Pinchot controversy
 - (c) Admission of two states
 - (d) Hudson-Fulton Celebration
 - (e) Dedication of Roosevelt Dam
 - (f) Glacier National Park opened
 - (g) Breach in Republican party
 - (h) Election of 1912

IV. Later Years

- (1) Professorship at Yale University
- (2) Chairman of Red Cross committee
- (3) The League to Enforce Peace
- (4) Writings

Questions

What was meant by "dollar diplomacy," and in what way was it in effect a reversal of the previous practice?

Explain Taft's clever use of a clause from the Constitution to establish the constitutionality of a Federal act.

To what, primarily, was Taft's election to the Presidency due?

What "playground" did the nation have at the close of this administration which it did not have at the beginning?

What political party was founded during this administration? Give the circumstances of its birth.

Who was Gifford Pinchot, and what part did he play in the history of this administration?

What other President was very popular at the beginning of his term and extremely unpopular at the end? What similarity is there in the later life of these two Presidents?

How did Taft's avowed purpose on entering college differ from that of his predecessor?

What unique distinction does Taft enjoy?

What was his record during the World War?

What is his connection with international peace?

her talents, especially those as a hostess and house-keeper, were required during the years following her marriage, for her husband's progress was rapid. The strain of the social routine of the White House proved too much for her rather frail health, and, in spite of her remarkable will power, Mrs. Taft suffered a breakdown in 1909. For a year she was very ill, and during that time her sister, Mrs. Louis More, wife of a professor at the University of Cincinnati, acted as White House hostess. Mrs. Taft inaugurated the custom of five o'clock teas at the White House.

Her children are Helen Taft Manning and two sons, Robert Alphonso Taft, and Charles Phelps Taft II.

Related Subjects. The reader who desires additional information respecting events connected with the life and times of this President is referred in these volumes to the following articles:

Banks and Banking
Bering Sea Controversy
City Manager
Commission Form of Government
Conservation
Initiative and Referendum
Labor, Department of Mexico (History)
Parcel Post

Philippine Islands (History)
Political Parties
Prohibition
Recall
Reciprocity
Roosevelt, Theodore
Supreme Court
Tariff
Trust

TAGALOG, *tah gah' log*. See **PHILIPPINE ISLANDS** (Language and Education).

TAGORE, *tah gohr'*, **SIR RABINDRANATH** (1861-1941), an Indian (Bengalese) poet, philosopher, and religious teacher, winner of the Nobel prize for literature in 1913. For twenty-five years before this award made his name familiar throughout Europe and America, he had been the prophet of his countrymen, one of whom said, "He is the first among our saints who has not refused to live, but has spoken out of life itself, and that is why we give him our love." His patriotic poems and songs helped to develop a racial and national consciousness, and won for him the name, "the Soul of Bengal."

In the beauties of nature—a cloud, a flower, a bird—he saw God. All his creations, whether



Photo: U & I

HELEN HERRON TAFT

poems, dramas, stories, essays, or lectures, deal with the things of the spirit, and contain something of that typical Hindu reverence which led his parents to send him, as a boy of eleven, into the Himalaya Mountains, that he might grasp the insignificance of the individual and the grandeur of solitude and space. His expressive language and unusual sentence structure draw pictures which stir the imagination. Tagore is primarily the interpreter of the East, and rarely shows the influence of Western civilization. When seventeen years of age, he attended school in England, and he has traveled in Europe and also in America, where he lectured in 1916 on "Internationalism." He has translated many of his own works into English; all these retain the feeling of the original, and a number have excellent technique.

Representative Titles. The most important of the translations are *Chitra*; *The Crescent Moon*; *The Gardener*; *Gitanjali* (*Song Offerings*); *King of the Dark Chamber*; *Post Office*; *Thought Relics*; and *The Wreck*.

TAGUA, *tah' gwah*, **PALM**. See **IVORY PALM**.

TAGUS, *ta' gus*, **RIVER**. See **SPAIN** (Rivers and Lakes).

TAHITI, *tah he' teh*, **ARCHIPELAGO**. See **PACIFIC ISLANDS**.

TAHOE, *ta' ho*, or *tah' ho*, a beautiful glacial lake on the boundary between California and Nevada, the largest body of water in the Sierra Nevada range. The mountains of two states, those on the Nevada shore, gray and rugged, and those on the California side, stately and verdant, are mirrored in its dark-blue waters. The outlet of the lake is in the rushing Truckee River, which carries the overflow to a "sink" known as Pyramid Lake, where the water evaporates. The woods of the adjacent slopes are filled with game, and the lake and swift mountain torrents abound with fish, making the region a paradise of the sportsman, as well as the delight of the tourist. Lake Tahoe is a popular summer resort, and in its vicinity are many attractive homes and fine hotels. The lake is oval-shaped, and is about twenty miles long and half as wide. It has an elevation above sea level of 6,225 feet, and an average depth of 1,500 feet. See **CALIFORNIA** and **NEVADA** (Rivers and Lakes).

TAILOR BIRD, a song bird of India, Malaysia, and the Philippines, so named from its habit of enclosing its nest within a large leaf, which it sews together at the edge, with its slender bill. The nest itself is made of plant down, fine grass, hair, etc., and is ingeniously sewed together with bits of silk or wool threads or with vegetable fiber, for which the bird searches most diligently. The eggs are three or four in number, varying in color from reddish-white to bluish-green, boldly marked with brownish-red. This bird has back plumage of



Photo: Wide World

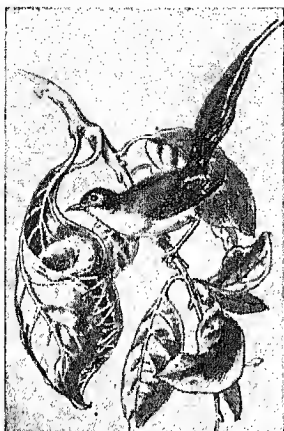
TAGORE

olive-green, white under parts, and a chestnut crown.

D.L.

Scientific Name. warbler group. Its scientific name is *Sutoria sutoria*.

The tailor bird belongs to the



TAILOR BIRD AND NEST

TAINÉ, *layn*, **HIPPOLYTE ADOLPHE** (1828-1893), a French historian and critic, born at Vouziers. He was a student from his childhood, and by the time he was fourteen years old, he had drawn up a schedule for his day's work to which he held rigidly—twenty minutes for play in the afternoon, an hour for music after dinner, and all the rest of his waking hours for study. The results of his intense application were seen when he entered the *École Normale*, where he speedily distinguished himself. In 1851 he was made professor of philosophy in the College of Toulon, but he soon resigned the position, to give his time to study and literary production.

In December, 1863, his celebrated *History of English Literature* appeared. Although biased, it is one of the greatest works of its kind, and has been translated into many languages. In the next year, he was appointed by the government, which had previously feared him because of his attitude toward Napoleon III, to a professorship in the *École des Beaux Arts*, where he distinguished himself by a series of excellent lectures on art. He continued to write critical studies on literature, art, and history, producing in the last fifteen years of his life his great work, *Origins of Contemporary France*, in which he discussed the causes of existing conditions in France. In 1878 he was made a member of the French Academy. Tainé is especially famous for insisting that an individual is the inevitable product of his race and environment.

R.T.H.

TAI-PING, *ti ping'*, **REBELLION**. See **CHINA** (History: Increased Intercourse with the World).

TAIWAN, *ti wahn'*, another name for Formosa (which see).

TAJ MAHAL, *tahsh mah hahl'*, the costliest private tomb in the world, built by the Indian ruler Shah Jehan (which see), as a final resting place for the remains of his favorite wife, Mumtaz-i-Mahal, "the pride of the Palace." The name *Taj Mahal* is the Persian for crown

of Mahal. This mausoleum, which some consider the most beautiful building ever constructed, is at Agra in northern India. Twenty thousand men were employed in its erection, which covered a period of twenty-one years (1632-1653).

Some buildings take on added beauty under the rays of a brilliant moon or in the light of the setting sun. Of the Taj Mahal it has been said that "it requires neither moonlight nor sunset; it brings its own atmosphere, its own light, 'that was never yet on land or sea.'"

The Taj Mahal is built of white marble. It stands on a platform of red sandstone 313 feet square, from the four corners of which rise slender minarets, or prayer towers, 133 feet high. The building itself is 186 feet square. Above the central portion, an exquisite dome 58 feet in diameter rises to a height of 200 feet above the platform. The outside of the mausoleum is adorned with passages from the Koran and ornamental designs in inlays of costly gems, and within is a central chamber containing two cenotaphs, which can be viewed through an alabaster screen of beautiful openwork. Below this chamber is the vault wherein lie the remains of Shah Jehan and his wife.

No artificial lighting is needed for the interior, for the dome is semi-transparent, and there are several windows with perforated alabaster screens. Through these the light glows with a marvelously softened effect. The structure is surrounded by a beautiful walled-in garden, with a superb gateway entrance. R.N.

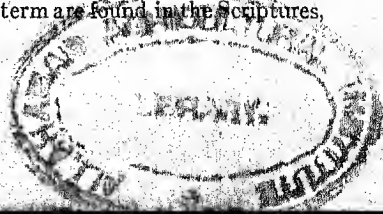
TAKU GLACIER. See **ALASKA**.

TALC, *talk*, a soft magnesian mineral commonly found in flat, smooth layers or plates (foliated), but sometimes in compact form. Soapstone, or steatite (which see), is a compact kind of talc. This mineral is so soft that it can be scratched with the finger nail. It is translucent, has a soapy feel, and is a poor conductor of heat. The foliated varieties may be white or greenish; the compact may be dark gray. Talc is used in the manufacture of crayons, porcelain, furnace linings, heating stoves, electric insulation, toilet powders, such as *talcum*, and other commodities. French chalk, used by tailors, is a fine granular variety serviceable for tracing lines on wood or cloth. Talc is sold in slabs and powdered form. About sixty per cent of the world's supply is produced in the United States. Vermont and New York are the leading states. Ontario produces a high grade talc which is imported into the United States.

A.N.W.

Chemical Formula. The formula for talc is $H_2Mg_3Si_4O_{12}$; that is, a molecule contains two atoms of hydrogen, three of magnesium, four of silicon, and twelve of oxygen.

TALENT, a famous ancient coin and unit of weight. Because the best-known references to this ancient term are found in the Scriptures,



there frequently exists the impression that it was the Hebrews who chiefly made use of the talent, but such is not the case. The word occurs in the Greek of the New Testament, and it is in connection with Greek affairs that the measure is chiefly known. The Hebrews, however, did have such a weight, derived from Babylonia, and equal to 3,000 shekels in silver, or between \$1,800 and \$1,920.

Like the Hebrews, the Greeks took the talent from the Babylonians, though the name is Greek. Both in measuring weights and in giving the denomination of money, the talent was the largest Greek unit, but it was by no means uniform in different Greek states and at different times. The talent used for measuring gold, moreover, differed from that for measuring silver, and to understand references in Greek literature to talents, it is necessary to know which of the various systems is intended. Perhaps the most commonly referred to, however, is the later Attic or Solonic, which was equivalent to about fifty-seven pounds. A silver talent in Athens was worth between \$1,000 and \$1,100.

The Romans also made use of the talent, not as a coin but as a measure of money. They had a *great talent* and a *little talent*, the former worth about \$480, the latter about \$363.

[The common present-day use of the word, meaning a special endowment or faculty, is derived from the parable of the talents in *Matthew* xxv, 14-30.]

TALES OF HOFFMANN. See **OPERA** (Some of the Famous Operas).

TALKING MACHINE. See **PHONOGRAPH**.

TALLADEGA, ALA. See **ALABAMA** (back of map).

TALLADEGA COLLEGE, a coeducational Negro institution in Talladega, Ala.

TALLAHASSEE, FLA., state capital and county seat of Leon County, is located in the extreme north central part of the state, 172 miles west of Jacksonville. It was founded in 1824. Center of a rich agricultural section, it is an important distributing point. Industries include machine shops, planing mills, a crate factory, a pecan processing plant, lumber, and naval store supplies. Tallahassee is the seat of the State College for Women, and the Florida Agricultural and Mechanical College (a state school for Negroes). Population, 16,240 (1940).

TALLAHATCHIE RIVER, a tributary of the Yazoo (which see) in Mississippi.

TALLAPOOSA RIVER. See **ALABAMA** (Rivers).

TALLEY, MARION NEVADA (1906-), a grand-opera singer who achieved fame when only nineteen years of age, as a leading soprano of the Metropolitan Opera Company, New York City. Miss Talley was born at Nevada, Mo. When an infant, her parents moved to Kansas City, where she was educated through

high school. When ten years of age, she was soloist in a Kansas City church choir, and at fifteen played the leading soprano rôle in two local opera performances. She showed such talent that a public concert was given for her, at which \$10,000 was realized, to enable her to continue her musical education in New York City. Shortly after she had obtained a hearing at the Metropolitan Opera House, she sailed for Europe and remained for a year, studying French and Italian.

Upon her return, Miss Talley was coached by members of the Metropolitan Opera Company, which she joined in 1925. She made her début as Gilda, in *Rigoletto*. After the close of her first season, she went on concert tour through the United States and Canada, and before she had reached the age of twenty-one, she had sung in 120 concerts and had appeared in fifty performances with the Metropolitan Company. In 1935 she appeared in motion pictures. Miss Talley has since retired to her farm in Kansas.

TALLEYRAND-PÉRIGORD, *lah leh rahN'-pa re gohr'* (in English, *tal' ih rand*), CHARLES MAURICE, Duke de, Prince of Benevento (1754-1838), a famous French statesman, born in Paris, and, next to Napoleon, the leading political character of his time. Though an eldest son, he was forced by lameness, resulting from an accident in his childhood, to give up a military career, and was destined by his family for the Church. Though he showed neither inclination nor aptitude for religious life, he continued his studies, and in 1775 was ordained. In 1780 he was made agent-general of the clergy of France, and in that position showed the administrative ability which in 1789 secured his appointment as bishop of Autun. In that same year, he was elected deputy to the States-General from Autun, and at once took rank as one of the foremost reformers.

Supported State Above Church. Talleyrand was one of the committee appointed to draw up a Constitution, was a signer of the Declaration of Rights, and by his advocacy of the confiscation of Church lands won great popularity. Because he took the oath to the Constitution and acknowledged the supremacy of the State, he was excommunicated by the Pope in 1791, and in that same year resigned his



TALLEYRAND

bishopric. Meanwhile, he had been a founder of the Friends of the Constitution, afterward the Jacobin Club, and had, in 1790, been elected president of the National Assembly; but, like Mirabeau, with whom he usually identified himself, he was not violent enough to please the radicals, and gradually lost influence. Thus, while in England on a diplomatic mission in 1792, he was declared to be one of the *émigrés* of royalist tendencies, and was forbidden to return to France. For two years he remained in England, then went to the United States, where he spent nearly three years.

Napoleon's Strong Aid. In 1796 Talleyrand was permitted to return to France, and, through the influence of Madame de Staël-Holstein, secured the post of Minister of Foreign Affairs. Seeing that Napoleon was the coming man in the country, he aided in the moves by which the Directory was overthrown and the consulate established, and as a reward was continued in his position as Foreign Minister. In this office he exerted himself to extend the power of Napoleon, who made him Grand Chamberlain in 1804, when the empire was founded. Talleyrand was the chief spirit in the formation of the Confederation of the Rhine, and in the negotiations with Prussia and Russia which, in 1807, culminated in the Peace of Tilsit. Soon after this, he resigned his office, and during the later years of Napoleon's reign became the rallying center of the discontented spirits who hoped for a return of the old monarchy. He drew up the terms of Napoleon's abdication, and at the Congress of Vienna made use of his unusual diplomatic powers to obtain concessions for France.

Talleyrand was Foreign Minister at the time that Pinckney, Marshall, and Gerry were sent by the United States to protest against unjust treatment on the high seas. It was Pinckney who hotly declared, "We have millions for defense, but not one cent for tribute."

Later Years. After Louis XVIII was established on the throne, Talleyrand took little part in public affairs, but when Louis Philippe became king, by the Revolution of 1830, he was sent as ambassador to England, and succeeded in forming a quadruple alliance among France, Great Britain, Spain, and Portugal. This was his last important public act. Before his death, he was reconciled to the Church.

Related Subjects. The following articles in these volumes will make clear certain references in this sketch of Talleyrand:

Bonaparte, Napoleon	Pinckney, Charles C.
Directory	Staël-Holstein
Émigrés	States-General
Jacobins	X.Y.Z. Correspondence
Mirabeau, Count de	

TALLOW, a hard, white substance obtained in the process of rendering animal fat, especially that of sheep, goats, and cattle. It is used extensively in the manufacture of soap,

candles, and lubricants, and for dressing skins and leathers; tallow of superior quality is employed in the making of oleomargarine.

Tallow is a mixture of the solid fats palmitin and stearin, and of the liquid fat olein. When pure, it is whiter than lard and practically tasteless, but the commercial product usually has a yellowish tinge. It will not dissolve in water, but is soluble in boiling alcohol. The best grade is obtained from fat near the kidneys of cattle. In one process of tallow-making, the suet is cut into small pieces and heated over water, until the fat has melted; it is then tried out. The tissues that are left are pressed, to obtain the tallow that may remain. Acid-rendering consists in boiling the fat with water and sulphuric acid, a process which causes the tissues to dissolve. Tallow is also produced by melting the suet in iron cylinders heated by steam under pressure. A substance similar to animal tallow is obtained from certain trees. See **TALLOW TREE**.

TALLOW TREE, the name of various trees which produce a waxlike substance that may be used, like tallow, for making candles. The tallow tree of China, which is the most widely distributed, has been introduced into North America, and is becoming naturalized along the coasts of Georgia and the Carolinas. At the approach of winter, the long, leathery leaves become a deep red, and among them hang the seeds, suspended by waxlike threads. The tallow, or wax, is obtained by crushing and boiling both capsules and seed, and skimming off the tallow as it rises. This substance is afterward melted and refined, and ordinary wax is added, to give a firmer consistency. It is used chiefly for candles, but a scented soap of good quality is also made from it, as it emits a balsamic odor. The leaves furnish a black dye, and the stem yields a resinous substance called *copal*, used in making varnish. The *bayberry*, or *candleberry* (which see), a small tree or shrub, also furnishes wax used in making candles. These burn slowly with a pleasant, piny fragrance, but do not give a strong light. G.M.S.

Scientific Name. The tallow tree described above belongs to the family *Euphorbiaceae*. Its botanical name is *Sapium sebiferum*.

TALMAGE, THOMAS DE WITT (1832-1902), one of the most famous clergymen and orators that America has produced, was born at Bound Brook, N. J. He attended the New York University but was not graduated, and in 1856 he received his degree from the Dutch Reformed Theological Seminary, at New Brunswick, N. J. Later in the same year he was ordained pastor of the Dutch Reformed Church, Belleville, N. J. He began immediately to attract notice through his remarkable oratory. In 1859 he accepted the pastorate of the Dutch Reformed Church at Syracuse, N. Y., and three years



later went to the church of the same denomination in Philadelphia. While holding this position, he also acted as chaplain in the Union army.

Talmage became pastor of the Central Presbyterian Church, Brooklyn, N. Y., in 1869, and within one year the congregation had become so large that an immense structure, known as the Brooklyn Tabernacle, was erected. There his eloquence and bold denunciation of evil attracted such audiences that even the new building was often uncomfortably crowded. He was in great demand as a lyceum lecturer, and his sermons appeared in many newspapers.



Photo: Brown Bros.
T. DE WITT TALMAGE

Between 1872 and 1894, the Tabernacle was burned three times. In the latter year, Dr. Talmage became associate pastor of the First Presbyterian Church at Washington, D. C., but resigned in 1899 to devote all his time to writing.

Writings. He was author of such popular religious books as *Every Day Religion*, *The Almond Tree in Blossom*, and *From Manger to Throne*.

TALMUD, the book of Jewish civil and religious law, aside from the Pentateuch. It had its beginnings in the time of Ezra, the period following the Exile, when new conditions of national life called for new laws. Decisions were made from time to time by those in authority, which, as centuries passed, grew into the mass of tradition known as the *Oral Law*. In the times of Jesus, the scribes and Pharisees required strict observance of all the details of this Law, but the Sadducees opposed it, declaring their only authority to be the Pentateuch. After the rise of Christianity and the destruction of Jerusalem by the Romans, pious Jews turned their zeal toward putting the Oral Law into writing. This work was completed at the close of the second century, and formed the part of the Talmud known as the *Mishna*, meaning *instruction*. After this, scholars commented on the *Mishna*, preserving their work in the second part of the Talmud, known as the *Gemara*. There are, in reality, two *Gemaras* extant, the Palestinian and the Babylonian, the latter being the larger and more trustworthy. It was completed in the sixth century. The *Mishna* was written in Hebrew; the commentaries, in Aramaic.

These Jewish works, though opposed to Christianity, did much to stimulate Christian

thought of the Middle Ages, and must be given a part of the credit for the German scholarship that made possible the Protestant Reformation. Students to-day find in them much interesting matter concerning Jewish manners and customs in Bible times. See HEBREW LANGUAGE AND LITERATURE.

TALON, *la lohN'*, JEAN BAPTISTE (1625-1691), a French official in Canada, one of the ablest of the men who created New France. He was born in Picardy, France. After his employment in the civil service of France, for some years, in 1663 he was appointed "intendant of justice and finance" for the French possessions in North America. Talon was able and energetic. He built a ship at the king's expense, in order to show the people how to build ships. He sent out engineers to search for coal, copper, lead, and other minerals, and he himself made shoes and woolen cloth, as an example to the colonists. He also gave much aid and encouragement to the Jesuits in the explorations and missionary enterprises on the shores of the Great Lakes. One of his orders provided that bachelors should not hunt, fish, or trade with the Indians, the obvious purpose of this order being to encourage permanent settlement by families.

What He Wrote. A book by Talon, *Memoire à Sa Majesté sur l'état présent du Canada*, published in 1667, is a valuable record for the history of New France.

TALUS, *la' lus*, an accumulation of rock waste, heaped against the base of, or covering a slope below, a cliff, and derived from the breaking off, by weathering, of material from the face of the cliff. A talus may consist of earth, sand, gravel, or large rock fragments, depending upon the material of which the cliff is formed and upon the mode of weathering. The material may be loosened and dislodged through soaking by rain, or through alternate freezing and thawing. In regions of scanty rainfall, the rocks may be broken down through intense heating by the sun's rays during the day, followed by sudden cooling after nightfall. In colder climates, a powerful agent in the weathering of cliffs is the splitting off of fragments by the expansion, upon freezing, of water in crevices in the rock. Taluses are striking features of the landscape in many mountainous regions. In the British Isles, they are more commonly known as *scree*s. See EROSION; GEOLOGY; SOIL (Formation). L. LaF.

TAMAQUA, *tah maw' kwah*, PA. See PENNSYLVANIA (back of map).

TAMARACK, the name applied in the Western and Middle United States to the *American larch*. In New England and Canada, it is known by the local name *hackmatack*. The tree is described in these volumes under the title LARCH. G.M.S.

TAMARIND, a large, tropical tree of the pulse family of plants, cultivated for ornament and utility. Its fruit, a brown pod from three to six inches long, is filled with an acid, juicy pulp which is used in India to make cooling beverages, such as sherbet. This pulp is shipped in large quantities to European countries, being packed in layers in casks. Boiled in sugar or syrup, it becomes the preserved tamarind of commerce. Tamarind seeds are used to make a yellow or red dye, and the root of the tree furnishes a beautiful hard wood, valued for cabinetwork, though fashioned with difficulty. The tree itself is very attractive, with wide-spreading branches and light-green foliage. It is widely distributed in warm countries, but has not been successfully cultivated anywhere in the United States, except in Florida. G.M.S.

Scientific Name. The tamarind tree belongs to the family *Leguminosae*. Its botanical name is *Tamarindus indica*.

TAMATAVE, *tah mah tak' vay*, a seaport of Madagascar (which see).

TAMBOURINE, *tam buh reen'*, an ancient musical instrument constructed on the principle of a drum, consisting of a circular wooden or metal frame about two inches deep, across the top of which is stretched a piece of tightly drawn parchment. Little bells are attached to the hoop, and these jingle when the parchment is struck. The tambourine has no musical pitch, but is used merely to beat rhythm. The performer plays it by striking the parchment with the knuckles or elbow. Spanish and Italian peasants and gypsies use it for their dances, shaking it to make the bells jingle, or hitting it against the foot while dancing. It is invariably found in Salvation Army bands, and is also used to take up collections. This instrument is similar to the *timbrel* of the Old Testament.

TAMERLANE. See MONGOLS; TIMUR.

TAMING OF THE SHREW, a comedy by William Shakespeare (which see).

TAMJURT, a peak of the Atlas Mountains (which see).

TAMMANY SOCIETY, also called THE COLUMBIAN ORDER, was founded in New York City, May 12, 1789, by William Mooney. He had been a soldier in the Revolutionary War, and started the organization as a "fraternity of patriots solemnly consecrated to the independence, the popular liberty, and the federal union of the country." The original members were those who, before the war, had been members of the "Sons of Liberty" and "Sons of Saint Tammany," societies which were organized to promote the cause of independence.

The organization of the society was by tribes, one for each of the thirteen states. The nomenclature was selected from words and phrases of the Delaware Indians, the name Tammany having been adapted from that of an Indian

chief. The members were called *braves*, the place of meeting was the *wigwam*, and the thirteen states were named *Eagle*, *Panther*, *Deer*, etc. The head officer of each tribe was a *sachem*, and the head of the national organization was the *grand sachem*. The honorary title of *great grand sachem* was conferred upon Washington and his successors for a time, but was abolished at the close of Jackson's administration. The master of ceremonies was called *sagamore*, and "Freedom our Rock" was adopted as the Society's motto. The Tammany Society as early as 1820 stood for manhood suffrage, without property qualifications.

After the government had tried, but failed repeatedly, to conclude a treaty of peace with the warlike Creek Indians, the Tammany Society undertook the task of conciliation, and brought the chief and twenty-eight of his warriors to New York City for a banquet, in August, 1790. Themselves dressed in full Indian costume, the Society's members escorted the Creeks to a conference with President Washington. The result was the signing of a treaty the next day.

The New York Historical Society, the Academy of Design, and many other educational institutions were founded or fostered by Tammany. On April 13, 1808, the Society marched in a body to Wallabout Bay, and laid the foundation stones for a mausoleum, where they later deposited the bones of 11,600 Revolutionary patriots. In the War of Secession, the grand sachem of Tammany, William D. Kennedy, led a regiment composed of members who were equipped by the organization.

The Society in Politics. Although the organization existed for many years for patriotic purposes, it soon came to have a twofold existence—patriotic and political—with the leadership of both elements in the same hands. Tammany Hall, the home of the Society, was eventually leased to the political element in its membership, with the privilege also of using the Society's name. For half a century, Tammany has been recognized solely as a political machine, wielding vast power, perfect in its organization, and determined to control the government of the city and state of New York.

Numerous scandals have darkened its history, the most notable one occurring in 1871, when Tammany Hall was under the leadership of William M. Tweed. Far-reaching bribery and corruption were charged against the organization, and Tweed was eventually sent to prison. About twenty-five years later, the power of Tammany spread until its influence was felt in national affairs, but its effort to dominate national politics has never been successful. Among Tweed's successors as leaders of Tammany have been Richard Croker, Charles F. Murphy, and George W. Olvany. Fully half of the time since the days of Croker,



Photo: U & U

AIRPLANE VIEW OF TAMPA

Tammany has had control of the administration of affairs in New York City, and has at times dominated the legislature at Albany. Tammany Hall has existed because of its influence over the masses of people on the East Side of New York City and across the river in Brooklyn, a part of Greater New York. Later investigations have involved prominent politicians and led to their subsequent resignations, indictments, and further discredited the organization. See also TWEED, WILLIAM MARCY.

TAMMERFORS, *tahn ur fors'*. See FINLAND (The Cities).

TAMPA, FLA., an industrial, commercial, and agricultural center on the western coast, is the county seat of Hillsborough County. It is situated on old Tampa Bay, at the entrance of the Hillsborough River, on Florida's West Coast.

Because of its pleasing location and mild climate, Tampa has become a favorite winter resort, with a fine tourist recreation center.

The University of Tampa now uses the magnificent city-owned structure formerly the Tampa Bay Hotel. Population, 108,391 (1940).

Transportation. A network of railroads, provided by the Atlantic Coast Line, the Seaboard Railway, and their subsidiaries, connects Tampa with railroad centers throughout the United States. Steamship lines operate from Tampa to the Orient, South

America, and the East and West Indies, as well as to other North American ports.

Industries. Tampa's many industrial concerns represent scores of different lines. Leading industries are shipbuilding, manufacture of clear Havana cigars (an average of almost 400,000,000 being turned out annually), phosphate products, cement, canned citrus (with more than 300,000,000 cans packed annually), chemicals, boxes, and tin containers.

History. The settlement of Tampa began with the establishment of an army post, about 1850. During the War of Secession, it was taken by the Federals, and here, in De Soto Park, the United States Volunteers encamped during the Spanish-American War. In 1886 railroads were constructed to the city, the cigar-manufacturing industry was established, and the city charter granted. The city is governed under a city-representative plan. G.T.B.

TAMPICO, *tam pe' ko*. See MEXICO (Leading Mexican Cities).

TAMPU TOCCO. See INCA.

TANA, *tah' nah*, a river of Norway. See NORWAY (Rivers and Lakes).

TANAGER, *tan' a jur*, the common name of a family of American birds noted for the brilliance of the male plumage. They are from six to eight inches long, and are usually found in the forests, where they feed on insects, fruit, and flowers. The tanagers dwell chiefly in the

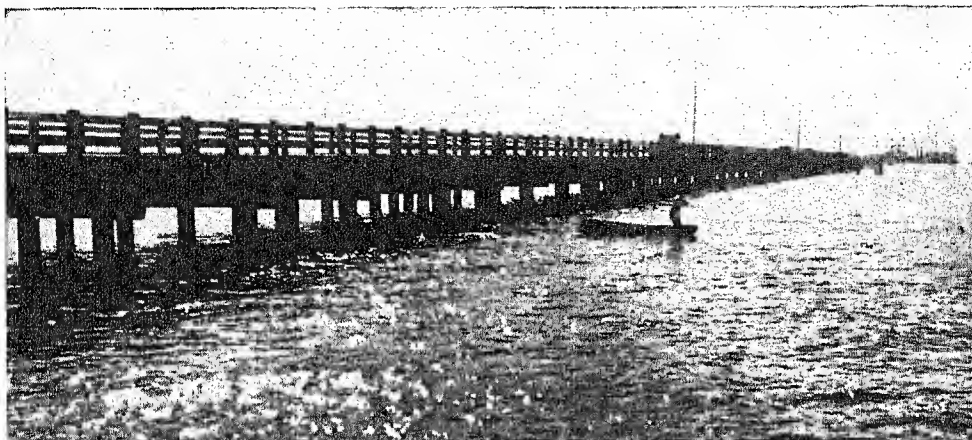


Photo: U & U

THE GANDY BRIDGE AT TAMPA

One of the longest automobile toll bridges in the world. The structure spans Old Tampa Bay, and connects Tampa and Saint Petersburg. It is nearly six miles long. For the saving in miles of travel between the cities named, see the map of Florida.

tropical regions of Central and South America, and only four or five species reach the United States in their migrations northward. Of these



Photo: Visual Education Service

A PAIR OF SUMMER TANAGERS

the best-known is the *scarlet tanager*, which nests in the Eastern United States and as far north as New Brunswick. The male has bright-scarlet plumage, with velvety-black wings and tail, and the female is pale yellow below and

olive-green above, with darker wings and tail. The nest is a frail, saucer-shaped structure, placed near the end of a horizontal limb, and the eggs, three to five in number, are pale bluish-white or bluish-green, with reddish-brown markings. The scarlet tanager has a loud, cheery singing note, something like that of the robin.

A familiar summer bird of the Southern states is the *summer tanager*, easily recognized by its rose-red plumage. It has much the same nesting habits and song as its scarlet-coated relative. Another interesting species is the *western tanager*, or *Louisiana tanager*, found in summer from the Rockies to the Pacific coast. The male of this group has black back, tail, and wings, crimson head, and yellow under parts. The tanagers are helpful in that they eat injurious insects, but the western tanager sometimes needs control, because of its fondness for cherries.

D.L.

Scientific Names. The tanagers constitute the family *Tanagridae*. The scarlet tanager is *Piranga erythromelas*; the summer is *P. rubra*; the western is *P. ludoviciana*.

TANANA, *tah nah nah'*, RIVER. See ALASKA (map, page 179).

TANANARIVE, *tah nah nah reev'*, or **TANANARIVO**, *tah nah nah re' vo*, the capital of Madagascar (which see).

TANCRED, *tang' kred* (about 1050-1112), prince of Antioch. With his cousin Bohemund he joined the First Crusade, swore allegiance to Alexius, the Greek emperor, and took an active part in the siege of Antioch. He soon joined himself to Godfrey of Lorraine, and in 1099 assisted in the capture of Bethlehem. During the siege of Jerusalem, he secured much booty and strengthened his power, shortly

thereafter being made Prince of Galilee. Between the years 1100 and 1103, during Bohemund's captivity, he served as regent of Antioch. Two years later, Bohemund surrendered the government of Antioch to Tancred, who by this time had also secured possession of the government of Edessa. In 1107 he wrested Cilicia from the Greeks, and thereafter his attacks were directed persistently against Northern Syria. Tasso (which see) has immortalized the name of Tancred in his famous *Jerusalem Delivered*.

TANEY, *law' nee*, ROGER BROOKE (1777-1864), one of the most noted Chief Justices of the United States Supreme Court, the jurist who gave the decision in the famous Dred Scott Case (see DRED SCOTT DECISION). This verdict was one of the important factors in the antislavery struggle that helped to bring on the War of Secession. Taney was born in Calvert County, Md., and was educated at Dickinson College (Pennsylvania). After studying law in Annapolis, he was admitted to the Maryland bar in 1799, and a few years later established himself in Baltimore. In 1831 President Andrew Jackson appointed him Attorney General, and relied upon him for advice and support.



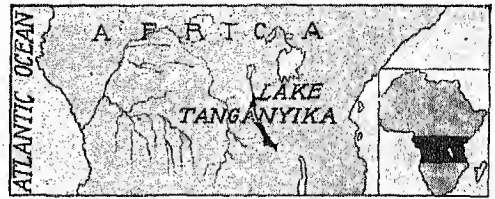
Photo: Brown Bros.

ROGER B. TANEY

Jackson, who was opposed to the United States Bank, determined to weaken it by withdrawing the government deposits. He could accomplish this only through his Secretary of the Treasury, and, after deposing two such Cabinet members for not complying with his orders, Jackson, in 1833, appointed Taney Secretary of the Treasury. Then the government deposits were forthwith removed. However, this procedure brought censure upon Taney, and the Senate refused to approve his appointment. In 1836 Taney succeeded John Marshall as Chief Justice of the Supreme Court. His decisions revealed a stricter construction of the Constitution than was typical of those of his predecessors.

TANGANYIKA, *tahn gahn ye' kah*, the longest fresh-water lake in the world, and one of the deepest, is situated in the east-central part of Africa, 175 miles southwest of Victoria Nyanza. It is about 450 miles in length and but thirty to forty-five miles in width, and its area is about 12,316 square miles. It is one and a half times as large as Massachusetts. The waters of Lake Tanganyika reach the

Congo River by way of the Lukuga, which flows from it on the west, and the lake is fed by several small streams whose sources are in the surrounding mountains. Profuse growths



LOCATION MAP

The long, narrow lake is Tanganyika; above, to the northeast, Lake Victoria; below, one-half visible, Nyassa. The small corner map shows in the black area the part of the continent appearing in the larger map.

of tropical plants are found on its shores, and its waters abound in fish, crocodiles, and hippopotami.

Tanganyika was first viewed by Europeans in 1858, when the town of Ujiji, on its eastern shore, was visited by the Burton and Speke expedition. It was at this place, in 1871, that Dr. Livingstone was found by Stanley. The latter explored the whole lake in 1876. Great Britain, Germany, and Belgium established stations on its shores, and the Germans, early in 1914, completed a railroad (775 miles) extending across the district then known as German East Africa (now Tanganyika Territory), from Dar-es-Salaam, on the Indian Ocean, to Kigoma. Germany lost all its African possessions after World War I. Belgium, since the war, has completed a railway from the Upper Congo region to the lake. In 1919 Great Britain added a portion of the shore line to its mandate, Tanganyika Territory (which see), and Belgium extended its territory to the northeast to include the mandated Ruanda and Urundi.

TANGANYIKA TERRITORY, from 1884 to 1919 known as GERMAN EAST AFRICA, is situated in the east-central part of the continent. It has an area of about 360,000 square miles (nearly one and one half times that of Texas), and an estimated population (1939) of 7,925 Europeans, 32,801 Asiatics, and 5,243,167 natives which are mostly Bantus (see BANTU).

German East Africa was conquered, during the later years of World War I, by a combined force of British and Belgian soldiers. The territory was placed under the control of Great Britain by mandate of the League of Nations, except a small part, Ruanda and Urundi, which was mandated to Belgium. Its affairs are administered by a governor, an executive council, and a legislative council, which was added in 1926. White settlers, because they are so few in number, are not yet given representation in the government. The gover-

nor is pledged to safeguard the laws and customs of the natives, unless they are opposed to justice or morality. Slavery was abolished in 1923.

Description and Resources. The coast, which is 620 miles long, is low and flat, but most of the interior is a tableland situated at an altitude of 3,000 to 4,000 feet. South and east of this tableland are several chains of mountains. In the northeastern corner of the colony rises the volcanic peak of Kilimanjaro, 19,321 feet in altitude, which is the highest point in Africa. The rivers are not navigable.

Agriculture and cattle raising form the chief occupation of the inhabitants. Millet, wheat, sisal hemp, cotton, tobacco, copra, rice, coffee, tea, and sugar cane are grown. Rubber is collected in increasing quantities. These products, together with ivory, constitute the chief exports. Coal, iron, gold, lead, mica, tin, copper, and salt have been found, and since 1926 diamonds have been mined.

The capital and chief seaport is Dar-es-Salaam (population, 34,000); it is connected with Kigoma, on Lake Tanganyika, a distance of 775 miles, by a railway (the Central Railway) which traverses the colony from east to west. There is another railway, running from Tanga to Arusha via Moshi, at the foot of Kilimanjaro, a distance of 272 miles. A line begun in 1924 from Tabora, on the Central Railway, was completed as far as Mwanza by 1928, a distance of 236 miles. Plans have also been made to connect Tanga, the important seaport on the north, with Dar-es-Salaam.

History. German colonization started here in 1884, and the boundaries of the colony were fixed by treaties concluded with England, Belgium, Portugal, and the sultan of Zanzibar, between 1884 and 1890. A serious uprising of the natives that took place in 1905 was soon crushed, but it had the effect of making the German authorities improve their treatment of the natives. During World War I, English and French troops invaded the colony and fought several engagements with the German forces, but without any decisive results. In 1916, the English and Belgians started a strong offensive, capturing the colony late in 1917. See map of Africa; illustration, page 79.

TANGERINE, *tan jur een'*, a variety of orange named for Tangier, Morocco. It is said to have been derived in America from the mandarin orange (see ORANGE). The tangerine is somewhat flattened, and is of a deeper color than the common orange. The peel is easily separated from the pulp, which is sweet and juicy. Although they are smaller than the common orange, tangerines are highly prized by many, on account of their flavor. They are raised in most of the Gulf states. Their scientific name is *Citrus nobilis*, var. *deliciosa*. B.M.D.

TANGIER, *tan jeer'*, a picturesque old town of Morocco, of which it is the principal seaport. There is a record which states that, in the year 788, Tangier was "the oldest and most beautiful city" of that part of the continent. In 1923, the city and surrounding area of 225 square miles were internationalized. The city is near the western entrance to the Strait of Gibraltar, about thirty-five miles southwest of the town of Gibraltar. From the sea, the town has the appearance of a great amphitheater, with white houses rising tier on tier; at the highest point, on a plateau to the north, is an old castle, a crumbling ruin. The tourist in Tangier is reminded of an ancient civilization at every turn of the narrow, winding streets, some of which are too steep to permit travel of vehicles. There are few manufactures, but the city is the center of the export trade of the country. In 1928, the Franco-Spanish railroad, extending from Tangier to Fez, was opened, and harbor improvements were under way.

Prior to World War II, the executive control of the town and zone was entrusted to an administrator and assistant administrators; the legislative power was vested in an international assembly of twenty-six members; their decisions were subject to the vote of a committee of control whose members were the consuls of the powers signatory to the Algeiras Act (France, Belgium, Spain, Great Britain, Italy, the Netherlands, Portugal, Russia, Sweden, the United States, and Morocco). A mendoub, a Moorish official, represented the sultan.

In June, 1940, Spanish troops occupied Tangier. International control was abolished, and in November the Spanish government announced the formal incorporation of Tangier under Spanish rule. Commanding the Atlantic entrance to the Strait of Gibraltar, Tangier was considered of great strategic importance.

The population of Tangier is about 60,000; 16,500 are Europeans, 7,000 are native Jews, and 36,500 are native Moslems.

TANKS. See WORLD WARS I and II, pages 7865, 7866-7867; TRACTION ENGINE.

TANNHÄUSER, *tahn' hoi zur*. See OPERA (Some of the Famous Operas).

TANNIN, OR TANNIC ACID. In a specific sense, these names are applied to an acid found in large quantities in gallnuts, produced on plants by the larvae of insects (see GALLS). It is a compound of carbon, hydrogen, and oxygen, and is an almost colorless, odorless powder, soluble in water and alcohol, and having a bitter, puckery taste. Considered in a general way, the tannins are a group of vegetable compounds widely distributed in plants, especially oak, acacia, quebracho, eucalyptus, hemlock, sumac, valonia, mangrove, and chestnut. Tannins of commercial importance find wide use in the tanning industry, as mordants in calico printing and dyeing, in ink manufacture,

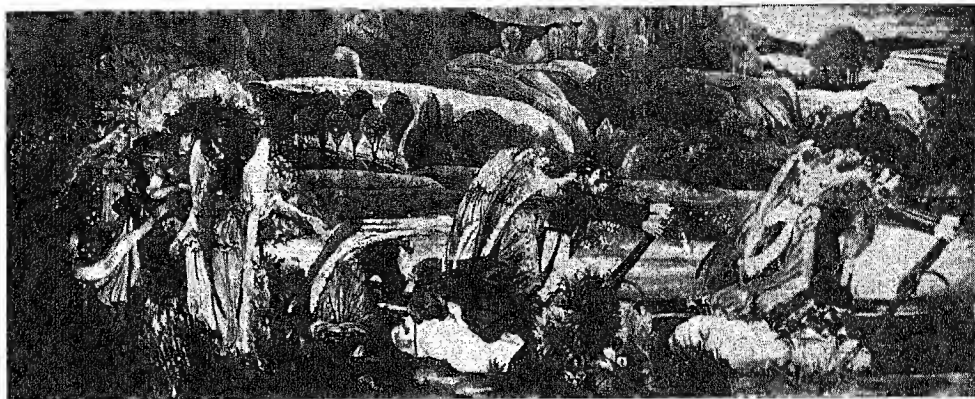


Photo: U & U

A MODERN BELGIAN TAPESTRY

Presented to the Crown Prince and Crown Princess of Belgium, Leopold and Astrid, on the occasion of their marriage in 1926. It was the work of a Belgian woman, Mlle. Dubois, a famous weaver. She spent thirteen years in its making. The tapestry was bought for the royal couple with money raised by popular subscription.

and as astringents in medicine. See **LEATHER**; **FIRST AID**.

T.B.J.

TANNING. See **LEATHER**; **TANNIN**.

TANNU TUVA, an independent republic under Soviet protection. See **CHINA** (Map).

TANSY, an herb of the composite family, whose leaves and flowers have a bitter taste and a powerful aromatic odor. At one time, young tansy leaves were used as a flavoring. Oil of tansy, yielded by the leaves, is poisonous, but is used in medicines to a limited extent. The plant grows commonly along roadsides, and is also cultivated in gardens. It bears dark-green, feather-like leaves, and flat-topped, yellow flowers, which appear at the top of the stem. Tansy is a native of Europe, and was introduced into North America, probably as a medicinal plant. Herb doctors formerly prescribed tansy tea for colds. The *yarrow*, a weed belonging to the same family, is sometimes wrongly called tansy. B.M.D.

Scientific Name. Tansy belongs to the family *Compositae*. Its botanical name is *Tanacetum vulgare*.

TANTA, EGYPT. See **EGYPT** (Modern Cities).

TANTALUM. See **CHEMISTRY** (The Elements).

TANTALUS, in mythology, a Grecian king who was said to be the son of Jupiter and the father of Pelops and Niobe. According to the legend, he killed his son Pelops and served him as a dish to the gods, who in punishment condemned Tantalus to terrible sufferings in Hades. Plagued by an unquenchable thirst, he was made to stand immersed to the chin in water, which always receded when he tried to drink; gnawed by never-ceasing hunger, he saw, hanging above him, fruit-laden branches which always swung away when he tried to reach them. From this legend the word *tantalize* is derived. See **NIOBE**; **PELOPS**.

TAOISM, *tah' oh iz'm*, one of the three great religions of China, was founded in the sixth century B.C. by the philosopher and sage, Lao-tse. He was a contemporary of Confucius, the great lawgiver of China, and of Buddha, the prophet-teacher of India and later of all Eastern Asia. Lao-tse's teachings are a noble way of life. Tao is his name for God, who to him was the Eternal Way, the Universal Reason, the Life within and above all things. Tao is kind. He wins by love. He overcomes injury with kindness. His true followers will do likewise. Those who tried to follow Lao-tse's way of life were called Taoists. Lao-tse loved nature and inspired many of his followers to build their homes in the high mountains. At the end of his life, it is said, he wrote his teachings in one little book, called the *Tao Teh King*. This book is one of the famous sacred scriptures of the world. In a few centuries Taoism had become sadly corrupted. All kinds of superstitions are still practiced in the name of Lao-tse. A.V.

TAOS, *tah' ohs*, MOUNT. See **NEW MEXICO** (The Land).

TAPAJOS, *tah pah' yohah*, RIVER, one of the principal branches of the Amazon River. It rises in the southern part of Brazil, midway between its eastern and western boundaries, and flows in a northwesterly, then in a northeasterly, direction, discharging into the Amazon near Santarum, after a course of about 1,200 miles. Its basin lies between those of the Madeira and the Xingu rivers. The Tapajos is navigable by small vessels throughout almost its entire length, although in the upper course there are falls and rapids.

TAPESTRY, an ornamental fabric used for decorating the walls of churches and palaces, and as a covering for windows, archways, furniture, and floors. Tapestries are made by a special process of weaving, described by an



Photo: Wide World

"THE TOILET OF THE PRINCESS"

This tapestry dates from about the year 1700. It was once the property of Elihu Yale (which see), and was presented to Yale University in 1926.

authority on the subject (Charles M. Froulke) as follows:

Tapestries are made by interweaving variously colored wool threads with undyed warp threads, after the warp threads have been stretched upon a loom, either vertically or horizontally. This interweaving is done with an implement called a *broché* in French, which is neither a shuttle nor a bobbin, but partakes of the character of both, and for which there is no equivalent word in English. The picture represented is developed upon the warp by the different colors of the wool threads. Needles are never used in weaving tapestries. In the process of weaving, the wool becomes practically an integral portion of the completed structure.

Tapestry-making, which dates from antiquity, reached its artistic heights in the fifteenth century. The industry was then centered in Flanders at Arras (now a city of France), and so excellent were the tapestries made there that the name of the city was applied to the fabric itself. In Shakespeare's *Hamlet*, to cite a familiar instance, Hamlet kills Polonius by driving his dagger through the arras behind which the eavesdropper is hidden. Antwerp, Brussels,

Bruges, Lille, and Valenciennes also developed as important centers of tapestry-making, and the art became nationalized in both France and Flanders. (See illustration, page 3069.)

In Paris, early in the seventeenth century, a factory under royal patronage was established in the dye works of the Gobelin family, and in 1662 the property was transferred to the control of the state. Gobelin tapestries became world famous, and the present museum connected with the establishment is one of two in the world in which tapestries and textile fabrics alone are exhibited. The other is in Florence. In the Gobelin museum may be seen tapestry reproductions of many of the great masterpieces of painting. In 1924 a Gobelin tapestry, valued at \$50,000, picturing the departure of American troops for the World War, was presented to the Philadelphia Art Museum by the French government.

There are also valuable state collections of tapestries in Madrid and Vienna, and throughout the European continent; in all parts of the civilized world there are countless beautiful

fabrics preserved in mansions, castles, cathedrals, and museums. These tapestries picture historical events, scenes from legend and mythology, Biblical episodes and personages, flowers, conventional designs, heraldic devices, coats of arms, etc. Among the famous specimens of this art is a series illustrating scenes in the life of the Apostles, copied from cartoons made by Raphael, and now in the Vatican. The celebrated Bayeux Tapestry in Bayeux, Normandy, is really an example of embroidery (see below).

Bayeux, bah yuh', Tapestry, the most remarkable and costly embroidery remaining from early medieval times, picturing, in a series of scenes, the life of Harold and the invasion and conquest of England by William the Conqueror. Tradition asserts that it is the work of the latter's wife, Matilda, and that it was made for Odo, bishop of Bayeux, as a decorative hanging for his cathedral, where it was found. It is 230 feet long and about twenty inches high, and contains 1,512 figures and inscriptions in Latin, worked in red, green, blue, and yellow wool, on a white canvas foundation. Authorities do not hesitate to consult it for details as to the manners and costumes of the time which it represents. The tapestry has been preserved in good condition, and is still kept in the library in the town of Bayeux.

[Bayeux is a very old town, and its life centers about its fine cathedral, said to be the most ancient in Normandy. It is in the Aure Valley, about five miles from the English Channel, and has a thriving agricultural trade, besides manufactures of porcelain, lace, and calico. Population, 1926, 6,500.]

TAPEWORM, an animal parasite that lives in the intestines of human beings and lower animals. It consists of a very small head and many body segments, and may vary in length from a few inches to ten yards. The parasite grows by the formation of new segments, or buds, which develop behind the head and are continually pushed backward as others form. The tail segment is therefore the oldest. The head has a ring of four sucking discs, by means of which the animal attaches itself to the mucous membrane of the intestine. It obtains food by absorbing nourishment through its skin; the body floats freely, and can take in nutriment from all sides. There are no digestive organs, and there is no mouth. Fertilization of eggs occurs in each division of the worm, and when the embryos reach a certain period of development, some of the end sections separate from the others and pass out of the vic-

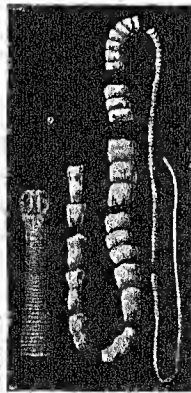
tim's body. It is the appearance of these pieces of worm that proves the existence of the parasite in the intestine.

There may be no symptoms of tapeworm. The presence of tapeworm may be discovered through finding portions of the worm in the stool. Among occasional symptoms of some value are unusual or irregular appetite, anaemia, weakness, and, rarely, convulsions. The presence of a tapeworm being suspected, saliva fumigatives should be taken, and the stools should be saved and examined for worm segments or eggs. The remedies used for tapeworm are extract of male fern or pomegranate, but these remedies are too dangerous to take, except under a physician's observation. After a dose of tapeworm medicine has been taken, the stools should be carefully examined for the worm, and especially for the head. The head, a tiny, blackish object, must be secured, or the worm will grow again. Tapeworms enter the body through the eating of poorly cooked pork or beef, or of fish infested with the larvae. See PARASITIC DISEASES. W.A.E.

TAPIOCA, a food starch widely used in the preparation of puddings. It is obtained from the root of cassava, a tropical plant belonging to the same family as the milkweed (see CASSAVA). There are two forms of root, the sweet and the bitter. The tapioca of commerce is extracted from bitter cassava, and comes chiefly from Brazil and the Straits Settlements. The roots are first washed, then cut, ground, and reduced to a pulp, after which the mass is strained until all the starchy particles are separated from the fibers. The moist, starchy mass is then placed on hot iron plates, and in the process of drying, the starch grains form the small, irregular, translucent balls known in the market as *pearl tapioca*. Another, finer form, called *minute tapioca*, is also marketed. This does not need the preliminary soaking required by pearl tapioca, before cooking.

The pudding made from tapioca is nutritious and easily digested. It is often served with sugar and cream or with a cream sauce. Apple or peach tapioca pudding, covered with a frosting made of white of egg and sugar, or served with cream sauce, is an attractive dish. Tapioca is rich in both starch and sugar, and has a fuel value of 1,650 calories per pound (see CALORIE). A flour made from cassava root is used as a thickening. G.M.S.

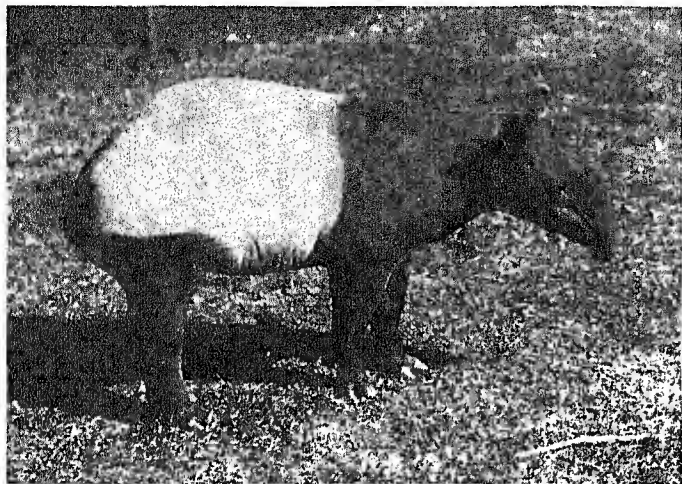
TAPIR, *ta' pur*, an ungainly animal related to the horse and the rhinoceros. There are five living species, four of which are found in the western hemisphere. The chief characteristics of the tapirs are a clumsily built body, short, stout legs, thick neck, and nose prolonged to form a movable trunk, or proboscis. They belong to the odd-toed mammals (see UNGULATES); the front feet have four toes and the back ones three. Tapirs are solitary, amiable



THE TAPEWORM

At the left is shown the head, considerably enlarged. The segments are parts of the worm. At the right are the head and head end of the worm, not greatly enlarged.

creatures, that live in the depths of the forests and frequent regions near water, in which they delight to plunge and bathe. They feed on shoots of trees, fruit, and other vegetable food,



which they draw into the mouth through the proboscis.

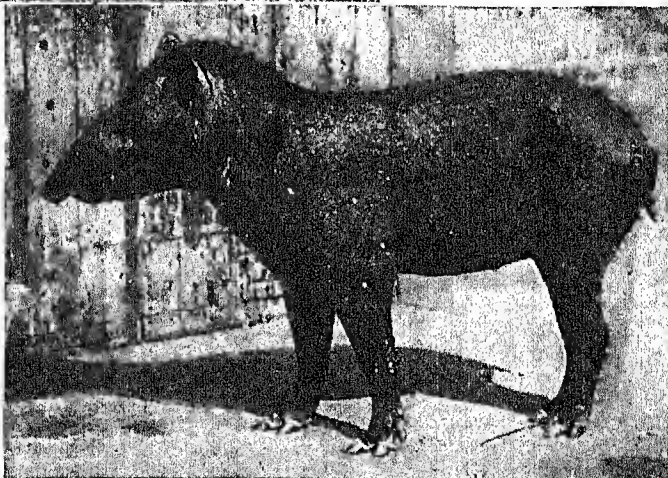
There are two species in South America, the most common of which inhabits the forest regions east of the Andes; the other dwells high up the slopes of these mountains. In Central America there are two species of hoglike tapirs, the smallest of the family. All of the American tapirs are of a uniform dark-brown color when grown, but the young are marked with fawn-colored stripes and spots. The Old World species is found in the Malayan region. It is larger than the American tapirs, being nearly four feet in height, and is very curiously marked, as its back, rump, and sides are white, and the rest of the body a glossy black, the two colors standing out prominently. The young, however, are marked like the young of the American species. Tapirs are hunted by the natives for their flesh and hides. W.N.H.

Scientific Names. Tapirs belong to the family *Tapiridae*. The species found east of the Andes is *Tapirus terrestris* (or *americanus*). The tapir of the Andean slopes is *T. roulini*. The Central American species form the subgenus *Tapirella*. The Malayan is *Tapirus indicus*.

TAPS, an army bugle call. See **BUGLE**.

TAR. When used without any qualifying word, this term refers to *wood tar*, the product of the special distillation of several kinds of wood, including pine, fir, and larch. *Coal tar*, a by-product obtained in the manufacture of illuminating gas from bituminous coal, is always referred to by that name (see **COAL TAR**).

Wood tar is a dark-colored, semi-fluid substance with a strong, pungent odor. It is used for coating and preserving timber exposed to the weather, for calking seams in boats and sidewalks, and in the construction of roofs. Medicinally, it is valued for its antiseptic qualities, and is used in the preparation of ointments and lotions for treating skin diseases. Tar is also an in-



Photost. Wildo World

THE TAPIR AND THE HORSE HAD COMMON ANCESTORS
Above, a saddleback tapir from the Netherlands Indies. Below, a solid-colored, American tapir from Brazil.

gradient of various cough mixtures, especially that yielded by pine wood. There are two methods for producing tar—stacking and slow firing, and distillation in retorts or ovens. The latter is the more economical and up-to-date, and it makes possible the isolation of valuable by-products. Among these is wood pitch, which is employed in the manufacture of varnish and artificial asphalts. Another is creosote (which see).

The stacking method, though crude and wasteful, is still practiced in the rural districts of North and South Carolina, Georgia, and

Alabama. Long-leaf pine is extensively used in these localities. Sticks of green wood are heaped to form a conical stack, the whole is covered with damp earth and sand, and the wood is permitted to burn slowly for several days. As the tar is melted out of the wood, it is collected in a large pan at the bottom of the stack, then conveyed through a pipe into a barrel. G.M.S.

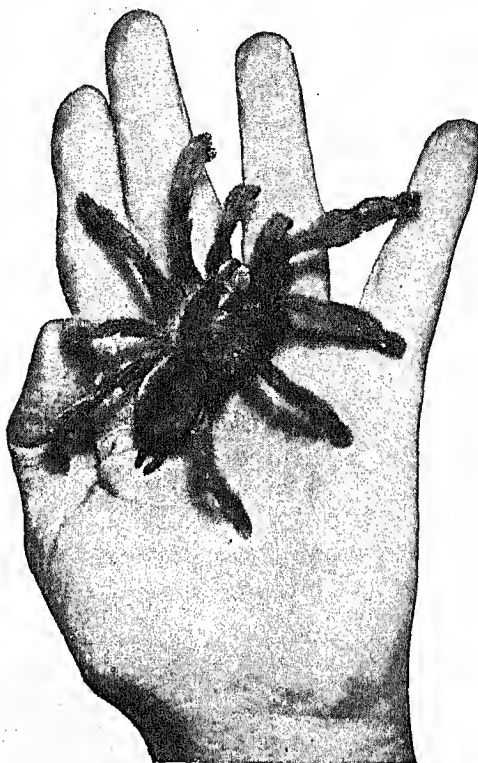
TARANTELLA, a national folk dance of Italy. See **DANCING**.

TARANTISM, *tair'-an tiz'm*. See **TARANTULA**.

TARANTO, *tah'-rahn toh*. See **ITALY** (The Cities).

TARANTULA, *tah-ran' tu lah*, a large spider named for Taranto, a city of Southern Italy, where it was first closely observed. It is still found there in great numbers. Formerly, its bite was supposed to cause *tarantism*, a peculiar dancing disease. The name, first applied in Europe, is now commonly given to any of the large, hairy spiders abundant in the Southwestern United States and in Central America, from which they are occasionally transported to temperate climes in cargoes of fruit. Tarantulas catch their prey, not in a web, as do many spiders, but by means of the sense of touch. Their homes are little wells in the ground, lined and covered with silky webs. Although their bite is painful, it is no more dangerous than that of other spiders, and, so far as known, is never fatal. S.H.S.

Scientific Names. The tarantula of Italy is classed as *Tarantula fasciventris*, of the family *Lycosidae*. The American spiders of that name belong to the family *Theraphosidae*.



THE TARANTULA

This one was dead before it was placed on the hand to be photographed. The size of this ugly spider can be judged from the illustration.



Photo: U & U

IDA M. TARBELL

TARBELL, IDA MINERVA (1857-), an American writer famed for her sociological and historical investigations, was born in Erie County, Pa. She was graduated from Allegheny College, and from 1883 to 1891 was associate editor of *The Chautauquan*. After studying for three years at the Sorbonne and the Collège de France, in Paris, she became, in 1894, associate editor of *McClure's Magazine*, a position which she held until 1906. In that year she accepted a similar position with the *American Magazine*, continuing in that post until 1915.

Writings. Besides a *Life of Abraham Lincoln*, *Life of Madame Roland*, *Short Life of Napoleon Bonaparte*, and *The Tariff in Our Times*, she wrote other biographical and historical sketches, numerous articles for magazines, and the book for which she is best known, *History of the Standard Oil Company*. This last-named work, by opening the eyes of the people to the power and the methods of great corporations, had a very real effect on business in the United States. Others are *The Business of Being a Woman*, *The Rising of the Tide*, *In the Footsteps of the Lincolns*, *Life of Judge Gary*, *A Reporter for Lincoln*, *Owen D. Young*, and *All in the Day's Work*.

TARE, a name applied to various species of vetch, but most often to *common*, or *spring*, *vetch*. The plant mentioned in the parable of the tares and wheat, found in *Matthew XIII*, 24-30, was probably darnel. See **VETCH**.

TARGET. See **ARCHERY**, subhead.

TARGUM, *tahr' gum*, a paraphrase of the Old Testament, in Aramaic, the language used by the Jews after the Exile. The version was made for use in the synagogue worship. At first the Targums were merely spoken explanations of the Hebrew text, but they gradually took on a fixed form and were reduced to writing. There are extant three Targums on the Pentateuch, one on the Prophets, and Targums on *Psalms*, *Job*, *Proverbs*, *Song of Songs*, *Ruth*, *Lamentations*, *Esther*, *Ecclesiastes*, and *Chronicles*. See **ARAMAIC**.

TAR-HEEL STATE, a popular name applied to North Carolina (which see).



STORY of the TARIFF

TARIFF, *tair' if*, a list or schedule of duties levied on goods sent to or arriving from foreign lands. In its original meaning, a tariff was not a tax or duty, but rather a list of articles on which duties were levied. However, for many years, the legal meaning of the word has included both the list and the rate, or duty. The word is derived from the Spanish *tarifa* and the French *tarif*, which mean a *price list* or *rate book*.

Tariffs are levied for three purposes: (1) to obtain revenue for the country; (2) to discourage the importation of certain foreign articles in order to protect the domestic producers of those articles; and (3) to retaliate upon other countries because of the high tariff duties imposed by them. This last form of tariff is seldom employed now, but its opposite, *reciprocity*, whereby one nation lowers its duties for another, if the latter returns the favor, is very common. A country which has a tariff for revenue only, without attempting to secure protection for its industries, is known as a free-trade nation. Free trade, of course, does not mean freedom from all tariff restrictions; a country may levy revenue duties on articles that cannot be produced within the country, or it may impose internal revenue taxes equal to the tariff duties, in which case the duties do not protect domestic production. There is no important nation which now maintains free trade.

Early Tariffs. The custom of collecting such revenue is very ancient. The early Egyptians and Babylonians levied import duties at their ports and city gates, while the government of Athens laid a duty of two per cent on both incoming and outgoing merchandise. Moreover, a duty or tax was collected by the Athenians for the use of their harbor by foreign vessels. The Roman government, about the time of Christ, was demanding five per cent of the value of goods as a regular import duty, and under the later emperors, this was increased to twelve and one-half per cent. Between the years 800 and 1500, the tariff conditions in Europe were perplexing. Every petty feudal

lord claimed the right to collect a revenue on goods passing through his lands, and oftentimes a merchant going from one city to another was obliged to pay such a fee every ten or fifteen miles. Merchandise going overland from Rome to Germany or Holland sometimes paid in tolls many times its original price.

England. It is certain that duties were collected at the London ports as early as 980, and by 1380 these were so important that Chaucer, the first great English poet, considered himself honored when appointed to the post of supervisor of London customs. Under Edward I, who ruled from 1272 to 1307, special duties were levied on goods brought by foreign merchants, thus establishing the first tariff for protection in England. Such duties were called *poundage*, because they were based on weight. In the seventeenth century, the ruler acquired the further right of taking two tuns or barrels of wine from every twenty imported; this tax was called *tunnage*. All these taxes on imports were considered temporary, and were frequently increased, decreased, or dropped; but toward the close of the seventeenth century, duties were made permanent, and were levied expressly for the purpose of paying the government debt.

Gradually, it became the custom to adjust the duty to the value, and not to the bulk or weight of an article, and from time to time, between 1545 and 1800, rate books were issued by the government, to show exactly what articles were thus taxed. The suffering of the British people, especially the Irish, because of a series of famines after 1840, convinced the members of Parliament that the islands could not produce enough cheap food for the inhabitants. The first great step toward free trade was the repeal of the Corn Laws, in 1846, followed by the abolition or reduction of more than a thousand duties. By 1860 Great Britain had become a free trade country. The British colonies failed to follow the mother country in her free trade policy; Australia, Canada, and South Africa insisted upon protective rates for numerous commodities. Of

recent years Great Britain has abandoned her historic free trade policy.

Other Countries. Countries not so peculiarly situated have not been inclined to adopt free trade. In France, for instance, high tariff was the rule until 1790, not only at the entrance ports, but between each little province within the country. The internal tariff was abolished during that year, but, with such exceptions as arise from a few reciprocity treaties, France imposed a high protective tariff on foreign goods. Germany had fairly moderate protective rates until 1902, when the duties on numerous agricultural and manufactured articles became almost prohibitive. Other European nations followed the examples of France and Germany, and eventually almost all civilized countries established high tariff duties.

United States. From the earliest days of the American nation, peculiar circumstances seemed to favor the adoption of protective rates. The bitterness between Great Britain and the new country had caused both Englishmen and Americans to desire that each other's goods be kept out, and it was looked upon as an act of patriotism in an American to discourage the importation of foreign merchandise. The immense debts of the Revolution and the War of 1812 made necessary the gathering of every available penny of revenue, while the feeble and easily frightened industries of the new land needed every possible aid. In time, when these infant industries became strong, their very strength was used as an argument for the continuance of the policy that built them up.

The first national tariff law in the United States was that of 1789. Although the law states that one of its objects is the "encouragement and protection of manufacturers," the duties levied by it were so moderate that the protection granted was slight. This act was superseded by the tariff of 1816, a distinctly protective measure. The duties were not high—the average rate was about twenty per cent—but they were in several cases sufficient to demonstrate the possibilities of protection to home industry. In the next year, the internal-revenue tax, which had prevailed since the War of 1812, was abolished, and President Monroe, in a message to Congress, frankly recommended a tariff solely for protection. Efforts were made in Congress to secure such a law, but no important tariff act passed both Houses until 1824. This law, which raised the average duty materially, was based on the principle that such foreign-made goods as competed with domestic products should be excluded from the American market.

The tariff was rapidly becoming the most important political question. The loose constructionists, under the leadership of Henry Clay, were the expounders of the "American system," which included a high protective tariff.

The tariff of 1828, generally called the "tariff of abominations," laid almost prohibitive duties on woolen and cotton goods and a few other commodities. This act aroused great opposition in the South, which then exported each year to Great Britain about \$25,000,000 worth of tobacco, cotton, and rice, whereas the imports of manufactured goods from Great Britain amounted to \$15,000,000. The South feared that prohibitive duties would lead to retaliation by Great Britain and thus kill its export trade in raw materials. The South also declared that the Constitution gave Congress power to levy duties for revenue only, and not for protection. The protests against this act culminated in the nullification movement, led by John C. Calhoun. Congress modified the duties slightly in 1832, but still definitely recognized the principle of protection.

As the tariff of 1832 was still unsatisfactory to the South, in 1833 a compromise was effected, whereby the duties would be gradually reduced until 1842, after which year there was to be a uniform duty of twenty per cent on all imports. In 1842, however, the Whigs passed a new law providing high duties. When the Democrats were returned to power, they promptly passed (1846) a new bill, the Walker Act, which was called a free-trade measure; it lowered some duties, but, in fact, it retained many of those which had been the subject of controversy in the preceding half century. In 1857 the duties were lowered again, this time without much opposition, because there was a growing surplus in the National Treasury.

The policy of decreasing the duties was abandoned at the outbreak of the War of Secession. The sentiment against protection had gradually increased after 1828, and, except for the period of 1842 to 1846, the duties had been slowly lowered. Without considering the possibility of war, Congress passed the Morrill Act of 1861, raising the average duty for the purpose of protection, and to secure revenue to meet increased expenses. During the next four years, not a session of Congress passed without some increases in duties. It was generally supposed that the duties would be drastically reduced, once the War of Secession was over, but, as a matter of fact, no marked reduction was made. The manufacturing industries of the country enjoyed a rapid growth; and there was a widespread feeling that protection was necessary and beneficial.

About 1880, however, the government's annual surplus began to increase, and Congress spent it wastefully. The demand for a real remedy, a lower tariff, led to the appointment of a Tariff Commission in 1882, to ascertain the effect of the existing tariff laws and to recommend changes in them. As the commission and Congress were both controlled by high protectionists, the resulting law of 1883 lowered but

few schedules; it was designed to give only such reductions as would silence the demands of the opposition. The tariff became one of the issues of the campaign of 1884, which resulted in the defeat of the Republicans and the election of Grover Cleveland, the first Democratic President since the War of Secession.

The Mills Bill of 1888, embodying the low-tariff ideas of President Cleveland and his party, was passed by the House, but failed to pass in the Senate, which the Republicans controlled. The Republicans, in their turn, interpreted the outcome of the campaign of 1888, which returned Harrison, a Republican President, as an endorsement of high tariff. The result was the McKinley Tariff Act of 1890, which raised the average level of duties to a higher point than ever before. A noteworthy feature of the act was the reciprocity clause, added through the influence of James G. Blaine, then Secretary of State. A month after this act was passed, the Democrats secured control of the House as the result of the November elections. In the ensuing Presidential campaign, the tariff was again the issue, and Cleveland's second election seemed to make a lower tariff inevitable. But because of the disturbed business conditions, following the panic of 1893, the controversy over the money question, and the narrow Democratic majority in the Senate, the high hopes entertained for a lower tariff were defeated. The Wilson Bill of 1894 made so few reductions that Cleveland showed his disapproval by allowing it to become a law without his signature (see CLEVELAND, GROVER).

The financial and economic crisis of 1894 to 1896 foreshadowed another change in the tariff. Although the campaign of 1896 was fought solely on the question of free silver, President McKinley called a special session of Congress to consider the tariff. In the resulting Dingley Tariff Act of 1897, protective duties reached a new maximum. During the Spanish-American War, a number of special duties, particularly one of ten cents a pound on tea, were levied for revenue purposes, but these were repealed in 1901 and 1902.

The industrial development of the United States since 1890 has been little short of marvelous. The Republicans, almost without exception, have attributed this growth to the protective tariff. The Democrats, with equal unanimity, have attributed it to the country's enormous natural resources, and have pointed to certain evils connected with industrial control, which they claim were caused by the tariff laws. The need of some readjustment of duties became clear about 1904, and after that date, both the great political parties declared themselves in favor of tariff revision. The Republicans, however, paid no attention to the tariff during Roosevelt's administration, and

when they did consider it, in the first year of Taft's administration, passed the Payne-Aldrich Law. There is still some dispute as to whether this act raised or lowered the level of the duties as levied under the Dingley tariffs. The changes were so numerous and so complex that nobody was quite sure what the effects of the law would be. The President defended the law as the best possible under the circumstances, but the public expressed its disapproval by returning a Democratic majority in the House of Representatives, a year later.

In 1913, immediately after his inauguration, President Wilson called a special session of Congress to enact a new tariff law. The new bill, known as the Simmons-Underwood Tariff Act, provided many changes in the rates. The duties on cotton and woolen goods were greatly lowered, and raw wool was placed on the free list. In 1916 Congress created the United States Tariff Commission.

In 1921 Congress passed an emergency tariff act. The chief object of the new schedule was to offer a greater measure of protection to American agriculture from foreign competition. This was followed in 1922 by the Fordney-McCumber Act, which raised duties somewhat over the previous rates. It also provided that the President, on the recommendation of the Tariff Commission, could raise or lower any rate, by not more than fifty per cent, in order to adapt the rates to changing conditions.

One of the greatest difficulties to be faced in the preparation of a tariff for the United States is the extent of the country's area and the variety of its industries. Thus, the clothing manufacturers of the East and Middle West want free wool, but the sheep-rancher in the Far West demands protection. The sugar-planter in the South wants a bounty or an import duty, to enable him to compete to better advantage with the planters in Cuba and the tropical regions, but the sugar-refiner and many other people ask for free sugar. Thus a general tariff act always involves compromise, usually characterized by the sacrificing of the interests of the people as a whole to the interests of certain sections and groups.

In 1929, President Hoover called a special session of Congress to consider changes in the tariff with particular reference to the needs of agriculture. The new measure, known as the Hawley-Smoot Bill, provided for substantial increases in the duties on many agricultural products. The increases ranged from 10 to 300 per cent. Changes were also proposed in the duties for other industries, but, owing to the opposition of a coalition group in the Senate, consisting of insurgent Republicans and Democrats, many provisions of the Bill were defeated. It was finally passed and signed by President Hoover in June, 1930.

On June 12, 1934, Congress passed the Trade

Agreements Act, which was an amendment to the Tariff Act of 1930. The Act empowered the president to negotiate foreign trade agreements involving the modification of tariff rates. The first reciprocal trade treaty to be signed after the passage of the Trade Agreements Act was the pact between the United States and Cuba, signed on August 24, 1934. In 1938, important Anglo-American and Canadian-American trade pacts were signed, with wide concessions to the United States. Extensions of the Trade Agreements Act were authorized by Congress in 1937, 1940, and 1943. E.J.

Related Subjects. The following articles will give further information on the subject of the tariff:

Democratic Party	Protection
Free Trade	Reciprocity
McKinley, William	Republican Party
Nullification	Tax and Taxes
Political Parties	United States

"TARIFF OF ABOMINATIONS." See TARIFF.

TARKINGTON, *tahr' king tun*, NEWTON BOOTH (1869-), an American novelist whose stories show a delightful blending of realism and idealism. He is one of the outstanding personalities of a brilliant group of contemporary Indiana writers.



Photo: P & A

BOOTH TARKINGTON

Tarkington was born in Indianapolis, educated at Phillips Exeter Academy and at Purdue and Princeton universities, and, aside from serving a term in the Indiana house of representatives, has devoted himself to writings since the appearance, in 1899, of his first novel, *The Gentleman from Indiana*. This vivid picture of the struggles of a young journalist in a backward Indiana village established his reputation and revealed a talent that has been steadily developed.

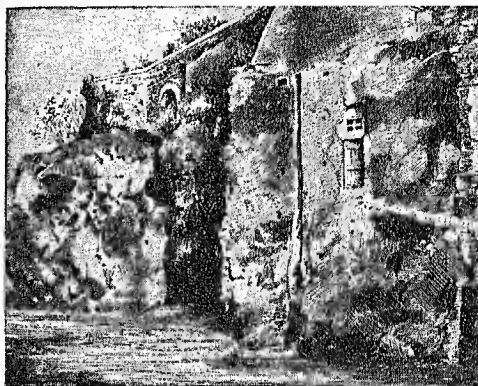
Representative Writings. *Monsieur Beaucaire*, a beautifully written romance of a French prince in disguise, appeared in 1900 as Tarkington's second novel. It is still popular; in dramatic form it was played successfully by Richard Mansfield, it had several seasons as an operetta, and was made into one of the most artistic moving pictures ever presented. Other novels followed in rapid succession, including *The Two Vanrevels*, *Cherry*, *The Conquest of Canaan*, the *Penrod* stories, *The Turmoil*, *Seventeen*, *The Magnificent Ambersons*, *Alice Adams*, *Gentle Julia*, *The Midlander*, *The Plutocrat*, *Claire Ambler*, *Mary's Neck*, *Wanton Mally*, and *Little Orvie*. Among plays, wholly or in part by him, the most popular have been *The Man from Home*, *Mister Antonio*, *Clarence*, and *The Intimate Strangers*. Tarkington has also written some original moving-picture stories, and a number of his novels and plays have been suc-

cessfully adapted to the screen. In his dramatic work, he has collaborated with Harry Leon Wilson and Julian Street.

TARN, a name applied to a small Scottish lake. See the article SCOTLAND (Rivers and Lakes).

TARO, *tah' ro*, a Hawaiian plant known in the United States as *elephant's ear*, or *caladium*. From it the national dish called *poi* is made. See HAWAII (The People); COLOCASIA.

TARPEIAN, *tahr pe' yan*, ROCK, a steep rock forming part of the Capitoline Hill at Rome. According to tradition, it was named



THE TARPEIAN ROCK

As it appears in the twentieth century.

for Tarpeia, the daughter of the governor of the Roman citadel in the time of Romulus. Desiring greatly the golden bracelets worn by the Sabine enemies of Rome, Tarpeia treacherously opened to them the gate of the fortress, having first gained from the Sabines a promise that they would give her what they wore on their left arms. Once within the citadel, they cast their shields (which they wore on their left arm) upon her, and crushed her to death. She was buried at the foot of the rock, which ever afterward bore her name. In later periods of Roman history, those convicted of treason were ordinarily killed by being thrown from the Tarpeian Rock.

TARPON, a large game fish shaped somewhat like a salmon, found in West Indian waters and off the southern Atlantic coast of the United States. It grows to the length of nearly seven feet, and sometimes weighs 200 pounds. The flesh is coarse and not desirable for food, but the large, tough, silvery scales are used in decorative designs. Tarpon-fishing is one of the best American sports, for the fish is a skilful fighter and very strong. While most of the fishing is done off the South Atlantic coast, the range is not so restricted. Tarpon are found in the waters just south of Massachusetts in the early fall. These are of uniform size, and weigh from 80 to 100 pounds. L.H.

Scientific Name. The tarpon is known as *Tarpon atlanticus*.

TARQUINIUS, *tahr kwín' ih us*, LUCIUS, surnamed PRISCUS, the fifth legendary king of Rome, who reigned from 616 to 578 B.C. He was not of royal blood, but succeeded in gaining the throne on the death of Ancus Marcius, to whose sons he had been appointed guardian. His reign was one of the periods to which later Rome looked back longingly, in times of trouble or depression. He waged successful war against the Sabines and the Latin cities, made vassals of the powerful Etruscan cities (see ETRURIA), and began many great public works, among which were the *cloacae*, or sewers, the Circus Maximus, and the Temple of Jupiter, on the Capitoline Hill. It was he, according to some legends, who acquired the Sibylline books (see SIBYL), though other traditions connect them with Tarquinius Superbus. He was assassinated by the sons of Ancus Marcius.

TARQUINIUS, LUCIUS, surnamed SUPERBUS (THE PROUD), the last of the legendary kings of Rome, whose reign was from 534 to 510 B.C. He was the son of Tarquinius Priscus and the son-in-law of Servius Tullius, whom he had put to death to secure his own accession. He at once annulled all of the reforms of his predecessor, depriving the lower classes of their rights and catering to the patrician class. His tyranny induced general hatred, and the crime of his son, Sextus Tarquinius, against Lucretia precipitated a rising which drove Tarquinius from the throne and resulted in the founding of the Roman Republic. Several unsuccessful attempts were made to replace Tarquinius on the throne, the most famous of which was that of Lars Porsena, celebrated by Macaulay in his *Horatius at the Bridge*.

Related Subjects. The reader is referred in these volumes to the following articles:

Horatius	Rome (The Period of Legend)
Lucretia	Servius Tullius

TAR RIVER, a stream of eastern North Carolina, flowing into the Pamlico River.

TARSAL BONES. See FOOT (in anatomy).

TARSUS, *tahr' sus*, the most important town in ancient Cilicia, in Asia Minor, and the birthplace of the Apostle Paul. Located in a fertile plain on the banks of the River Cydnus, twelve miles from the sea, Tarsus was a center of commerce from very early times. In the days of Paul, it was one of the "free cities" of the Roman Empire, and was renowned as a center of education and culture. Paul himself described it as "no mean city." Modern Tarsus, though it has a population of 73,680 (1927), is a backward and unattractive Turkish town, with no features of particular interest other than a few ruins of the Roman era. See PAUL; ASIA MINOR.

TARTAGLIA, *tahr tahl' yah*, NICHOLAS. See ALGEBRA.

TARTAN, *tahr' tan*, from the French *tiretaine* and the Spanish *tiritaña*, meaning a *thin woolen* or *silken cloth*, is the name of a worsted cloth checkered or crossbarred with threads of different colors. Tartan is historically associated with the costumes of the Highlanders of Scotland, and, according to tradition, each of the numerous clans had its own distinguishing tartan or plaid. Thus there was the tartan of Campbell of Argyll, light green crossed with dark green, with narrow, independent crosslines of white; the Macdonald of Glengarry and Keppoch, red, with open, broad blue crosslines, and two independent blue crossings; the Macpherson, pale gray, four darker gray bars at crossings, the whole covered with red, double independent lines; and so on. The effect of a large number of these tartan costumes is suggested by Scott, in the *Lady of the Lake*:

Scarce to be known by curious eye
From the deep heather where they lie,
So well was match'd the tartan screen
With heath-bell dark and brackens green.

Tartan is not at the present time restricted to Scotland, but is also worn in various other countries. Numerous designs are manufactured, and woolen, silk, and mixed goods are used as materials.

TARTAR, OR ARGOL, a substance deposited as a hard crust on the sides of casks during the fermentation of grape juice. Chemically, it is known as impure acid potassium tartrate. Tartar varies in color from brownish-white to dark red, according to the color of the wine. It is important commercially as the source of cream of tartar (see CREAM OF TARTAR, for methods of preparation). The tartar that is formed on the teeth is a hard mixture of phosphate and lime deposited from the saliva. See TEETH. T.B.J.

TARTAR EMETIC, *e met' ik*, a medicinal preparation used in small doses as an emetic, or to increase the secretion and hasten the expulsion of mucus in respiratory diseases. In large doses, it is a violent, irritant poison. Tartar emetic acts on the stomach and intestines, and exerts a depressing effect on the heart and nervous system, and is now only sparingly used. It should never be taken unless prescribed by a competent physician. It is prepared by making a paste of water, antimony oxide, and acid potassium tartrate, boiling the mixture with water, and letting the solution crystallize.

TARTARIC ACID, a vegetable acid occurring as the potassium salt in many plants and unripe fruits, but especially in grapes. It is obtained commercially by treating the tartar deposited in wine casks (see TARTAR) with

lime and sulphuric acid. The ordinary product occurs in the form of large, clear crystals easily dissolved in water, the solution effervescing and having a refreshing, sour taste. It is used in the manufacture of dyestuffs and baking powders, in dyeing and calico-printing, in photography, and as one ingredient of Seidlitz powders (which see). See, also, TARTAR EMETIC.

T.B.J.

Chemical Formula. The formula for tartaric acid is $C_4H_6O_6$; that is, a molecule contains four atoms of carbon, six of hydrogen, and six of oxygen.

TARTARS, OR TATARS, *tah' tahrz*, originally the name of the Mongolic races of Central Asia who lived in Northeastern Gobi in the fifth century, and, driven southward by the Khitans four hundred years later, founded the Mongol empire. Today, the term is used to designate many peoples, principally of Turkish origin, living in Western Asia and European Russia. See MONGOLS.

The western invasion of the Mongols in the thirteenth century gathered many Turkish stocks, as it approached the Ural and Altai mountains and the plains of Eastern Russia; and farther west they intermingled with Finnish and other ancient tribes, until the Mongol element became very weak and the Turkish more predominant. There are innumerable groups living in European Russia and Siberia which are given the name Tatars, or Tartars, and though their characteristics and original stocks vary with their geographic location, they are for the most part Mohammedan, and speak a Turkish language or dialect. Some are nomads, who gain a living by cattle-breeding and fishing, and others are agriculturists and gardeners.

Tatar took the form *Tartar* at an early date, by association with *Tartarus*, the Hades of classic mythology. The tribes bearing the name were greatly feared, because of the atrocities they committed. The word *Tartar*, however, is not correct from the standpoint of etymology.

Tatar is a Tungusic or Manchu word, meaning *archer* or *nomad*.

C.W.

TARTARUS, *tahr' tahr us*, in early Greek mythology, a dark abyss surrounded by the fiery river Phlegethon, where Jupiter imprisoned the rebelling Titans (which see). Tartarus was later considered the place of punishment for all spirits of the wicked, and the name was used interchangeably with Hades, although Homer locates it as far below Hades as earth is below heaven. Aeneas, in his adventures in the abode of shades, came to a point where the road divides, the right branch leading to Elysium and the left to Tartarus.

In Literature. In Vergil's *Aeneid* occur these lines: There rolls swift Phlegethon, with thund'ring sound, His broken rocks, and whirls his surges round.

On mighty columns rais'd sublime are hung
The massy gates, impenetrably strong.

TARTARY, a name applied in the Middle Ages to that part of Eurasia inhabited by the Tartars (or Tatars). It included Manchuria, Mongolia, Turkestan, and the southern part of European and Asiatic Russia. The Tartars (which see) were fierce and warlike, and had the reputation of being very cruel in war. The modern expression, "to catch a Tartar," means to find a resourceful opponent in one considered easy to overcome, either in combat or in a test of mental powers. There is also an expression, "Scratch a Russian and you find a Tartar," meaning that, beneath the veneer of Russian civilization, lies the ferocity of a Tartar. This, however, does not apply to the Russians as a whole.

TASHKENT, *tahsh' kent*. See UZBEK.

TASMAN, *tahs' mahn*, ABEL J. See AUSTRALIA (History: Exploration and Colonization); TASMANIA.

TASMANIA, *taz ma' nih ah*, formerly called VAN DIEMEN'S LAND, is a state in the Commonwealth of Australia. It consists of one large and several small islands, separated from the

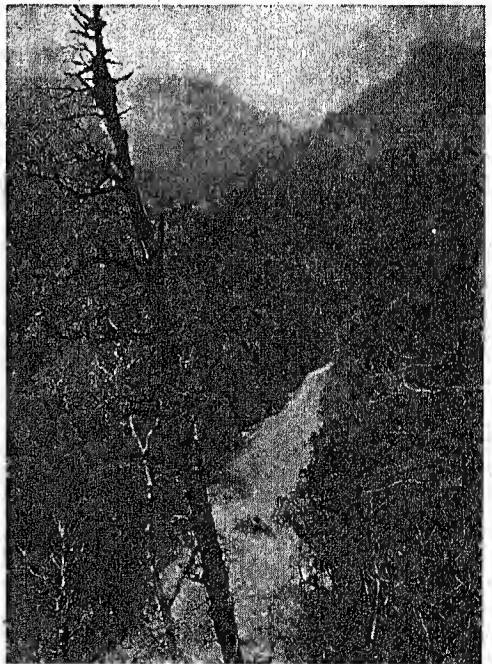


Photo: Australian Government

KING RIVER

A rushing torrent descending from the picturesque central highlands.

southeastern part of the mainland by Bass Strait, 140 miles wide. The island of Tasmania is of triangular shape, 180 miles from north to south, and 190 miles from east to west.

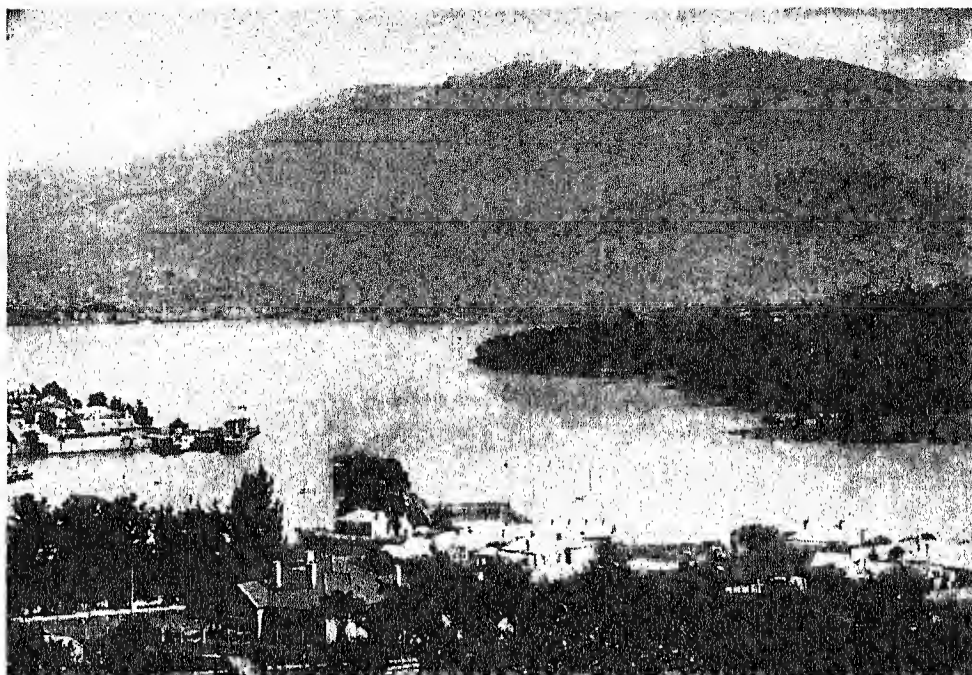


Photo: Australian Government

HOBART AND MOUNT WELLINGTON

The area of the entire state is 26,215 square miles, about that of West Virginia and Delaware combined. The population of 239,948 (1941) is chiefly Australian-born. The aborigines of Tasmania are extinct. In religious affiliations, the people are mostly Anglicans, Roman Catholics, Methodists, and Presbyterians. Elementary education is free, and compulsory between the ages of seven and fourteen. Instruction extends from primary classes to the University of Tasmania, established in 1890.

Physical Features. The coast is remarkable for its bold headlands and picturesque inlets. The interior of the island forms a plateau with an elevation of between 3,000 and 5,000 feet above the sea level; this plateau contains many lakes. The mountain ranges bordering the central plateau do not reach a very great altitude, the highest point being Mount Cradle, which is 5,069 feet above sea level.

The geological formation of Tasmania is intimately connected with that of Victoria, on the main Australian continent, to which it was joined until after the Miocene Period.

The plant life resembles that of the continent as a whole, as also does the animal life, except for the absence of the dingo, or wild dog of Australia. Tasmania has two carnivorous animals which are peculiar to that country: the Tasmanian zebra wolf and the untamable Tasmanian devil, resembling a small bear.

The climate, though quite variable, is really delightful, and more healthful than that of any other of the Australian states. The heat is not usually excessive, though, during exceptionally hot periods, the thermometer has been known to rise as high as 100° F.; it seldom drops below 47° F. The island is well watered, possessing rivers which flow into the sea on every side.

Industries and Transportation. The soil is very fertile, and agriculture forms one of the chief occupations of the inhabitants. Oats are the chief crop. Hops, wheat, peas, hay, and potatoes are also grown. Fruit is extensively cultivated for jams and jellies.

The pastoral lands support great numbers of sheep and cattle, but the "meat" cattle are being supplanted by dairy herds. The forests yield great logs of eucalyptus. Mining, however, is the source of the principal wealth of the state. Copper, gold, silver, tin, lead, zinc, shale, and coal are produced, the combined value of the mine production exceeding that of crops. There are vast iron reserves, though the ores are little worked.



TASMANIA LOCATION MAP

The island lies south of Victoria. For political map, see AUSTRALIA (map).

Tasmania has many desirable features for manufacturing, including a cool climate, natural resources, and water power. The state owns and controls the water power and sells it direct to the consumers, and developments are under way constantly to increase the supply. The principal industries are mining, the operation of metallurgical plants, saw-milling, the production of jams and preserves, dairy products, bricks, tiles, and pottery, and tanning. Smaller, but rapidly becoming more important, are the chemical, carbide, and electrode industries, especially those connected with zinc; furniture manufacture; and the making of farm implements.

The total length of the railroad system in Tasmania amounts to about 800 miles. More than three-fourths of the mileage is owned by the state. Macadamized roads, kept in good repair, run throughout the island.

Government and History. The government of Tasmania is similar to that of each of the other Australian states. The chief executive is a governor, and lawmaking is entrusted to a legislative council of eighteen members, chosen for six years, and a house of assembly, whose thirty members are chosen for five years.

Tasmania sends six Senators and five Representatives to the Federal Parliament of Australia. Members of the legislative council are elected by proportional representation, and the electorate is restricted by certain property, military, and occupational qualifications; all adults twenty-one years of age, who have resided in the state for six months, may vote for members to the house of assembly. The franchise was extended to women in 1903.

Van Diemen's Land, as Tasmania was first named, was discovered by Abel J. Tasman, the Dutch navigator, in 1642, and named after his patron Van Diemen, governor of the Dutch East Indies. It was first settled in 1803 by a party of convicts from Great Britain, and for fifty years received convicts from all parts of the British Isles. When the convict-settlement system was abolished in New South Wales, in 1840, demands for similar reforms and a responsible government arose in Van Diemen's Land. In 1853 this was partly accomplished, and the name of the island state was changed to Tasmania; however, responsible government did not come until three

years later. The gold discovered in Victoria in the fifties brought prosperity. Tasmania has been a thriving member of the Commonwealth of Australia since its formation in 1901.

Hobart, prior to 1881 called HOBART TOWN, is the capital of Tasmania. The city is beautifully situated on a bay of the Derwent River, twelve miles from its mouth. The harbor is deep and well sheltered, and accommodates the largest vessels. From Hobart,

Roald Amundsen sailed due south on his voyage that resulted in the discovery of the South Pole; and from that city was flashed to all the world the news of his achievement.

Hobart is a flourishing city situated in the midst of the fruit-growing district of Tasmania. It is the seat of the state university. On account of its invigorating climate, Hobart is a popular resort, and

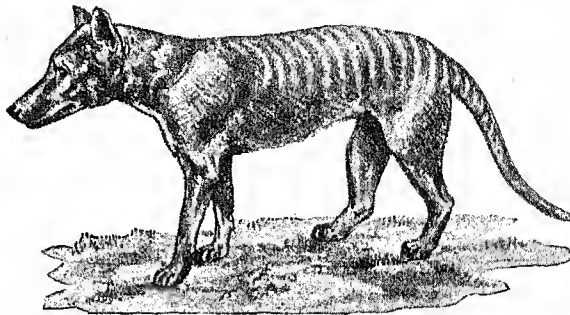
an annual regatta held on the Derwent attracts visitors from all parts of Australia. Population, including suburbs spread out along the banks of the river, 66,730 (1941).

Related Subjects. The reader is referred in these volumes to the following articles:

Australia	Dingo
British Empire, and British Commonwealth of Nations	Tasmanian Devil
	Tasmanian Wolf

TASMANIAN DEVIL, a carnivorous animal peculiar to Tasmania and noted for its ferocity. It is a burrowing marsupial, with coarse black hair. Though only about the size of the common badger, it sometimes destroys sheep. Its scientific name is *Sarcophilus ursinus*, showing its relationship to the bear family (see BEAR).

TASMANIAN WOLF, THE, also called ZEBRA WOLF, THYLACINE, and POUCH DOG, is a pouched animal that resembles a wolf or wild dog in appearance. It is a native of Tasmania, an island state of the Australian Commonwealth. The Tasmanian wolf is usually about forty inches long, but sometimes attains a greater size. The short fur is grayish-brown, and there are black stripes across the back, much like those of a zebra. The nose is long and sharp, and the tail is tapering. These animals were common in Tasmania in early days, but the European settlers succeeded in driving them into the mountains, after great depredations had been committed in sheepfolds and poultry yards. They hide in burrows or gulches in the daytime, making nightly raids for food. They differ from some of the other marsupials in that the marsupium, or brood pouch, opens backward. See MARSUPIALS. L.H.



THE TASMANIAN WOLF

Scientific Name. The Tasmanian wolf belongs to the family *Dasyuridae*. Its scientific name is *Thylacinus cynocephalus*.

TASSAGO, tah sah' go. See PEMMICAN.

TASSO, tas' o, TORQUATO (1544-1595), one of the greatest of the Italian poets, was born at Sorrento. His father, a fifteenth-century poet, took him to Rome at the age of ten, and there gave him careful training in literature and history. At that time he showed evidence of a remarkable memory and could recite long portions from Greek and Latin works. He was sent, at the age of sixteen, to the University of Padua, Italy, to study law, but within a year produced a romantic poem in twelve cantos, entitled *Rinaldo*. This remarkable work, dealing with the legends of Charlemagne, greatly surprised and gratified the Italian reading public. Although the father wished his son to confine his energies to law, which he believed to be more profitable than literature, he permitted Torquato to study philosophy and poetry. On an invitation of the authorities of the University of Bologna, the youth went to that institution, but in 1564 he had to leave the school, because he was unjustly accused of writing certain bitter satires against the professors. He then returned to the University of Padua, where his admiration for Vergil's poetry became so intense that he determined to write an epic along the lines of the *Iliad*.

At this time the Turks were harassing the Hungarians and the Italians, and the popular talk of another crusade against those invaders suggested to Tasso the idea of basing his creation upon the adventures of Godfrey de Bouillon in a crusade to Jerusalem. Thus began the famous *Jerusalem Delivered*, which, after Dante's *Divine Comedy*, is given rank as one of the greatest epics in the Italian language. While he was engaged in planning and writing portions of this long work, he found a patron in Cardinal d'Este, who took him to one of the centers of Italian culture, the court of Ferrara. There, amidst magnificent surroundings, noted men, beautiful women, and his own love affairs, he gained a multitude of experiences which he afterward included in his heroic poem. A quarrel with his patron sent him forth penniless in 1571, but Duke Alfonso of Ferrara sheltered him, and, under the patronage of this nobleman, he produced in 1573 the *Aminia*, possibly the most beautiful of all Italian pastoral plays.



Photo: Brown Bros.

TASSO

In April, 1575, Tasso announced that his *Jerusalem Delivered* was finished, but before publishing it he desired its examination by a body of churchmen, lest the charge of heresy or infidelity be brought against him. The churchmen demanded that all mythology and chivalrous adventures be omitted, and persecuted him with their criticisms. A blow on the head during a quarrel added to his mental discomfort, and in 1576 he showed signs of insanity. He had an idea that he was constantly being watched, and in June, 1577, while in the home of the Duchess of Urbino, drew a knife on a servant whom he considered a spy. He was taken to a country home, but escaped and wandered from town to town. In February, 1579, he returned to the court of Ferrara, and burst into the royal rooms with such signs of rage that he was confined as a madman. At length he was allowed to go to Naples, where he composed his *Jerusalem Conquered*, really a revision of the other epic, with most of the chivalry omitted.

In 1594 Tasso was ordered to Rome by Pope Clement VIII to be crowned for his poetry, but in the midst of the preparations, he became ill; within a few months, he died in the Convent of Santo Onofrio, near the city. The pathetic story of his life has furnished a theme to such writers as Goethe, Lamartine, and Byron. *Rinaldo*, the *Aminia*, a tragedy entitled *Torrismondo*, and *Jerusalem Delivered* are among the greatest of Italian writings, while the last-mentioned poem is classed as one of the world's noblest epics. See ITALIAN LANGUAGE AND LITERATURE.

TASTE, one of the special, or *exterior*, senses—the one through which we recognize certain substances when they are taken into the mouth. The sense of taste is located in the mucous membrane on the upper side of the tongue and the upper back part of the mouth. On this membrane are numerous minute elevations called *taste buds*, containing the endings of the nerve filaments which convey the impulse to the taste centers in the brain. When the sensation is registered by the brain centers, it is identified as *sweet, sour, bitter, or salty*. All taste sensations are formed by combinations of these, or by combination of one of them with the sense of smell. These two special senses are very closely related, and it often happens that smell sensations are mistaken for those of taste. Also, when the sense of smell is deadened by a cold in the head, the victim usually complains that he cannot taste well, or that all foods taste alike. The "mouth-watering" that occurs when an appetizing odor greets the nostrils is another example of a delicate relationship existing between smell and taste. In this case, there is stimulation of the salivary glands, brought about by anticipation of the enjoyment of eating.



Photo: Visual Education Service

A Proud Boy of Burma. Example of the art of tattooing as practiced in the East Indies.

The sense of taste is one that can be trained. In the grocery trade, for instance, the buyers use this sense in appraising the quality of coffee, tea, butter, and other commodities. It is also a sense that will become tired if not used with discretion, and since it adds greatly to one's ability to enjoy life, it should not be abused. People who indulge to an excessive degree in candies, highly seasoned foods, and the like impair their power to enjoy them. The ideal way is to eat plain food, as a rule, and delicacies but occasionally. If such a method is followed, the sense of taste will not become vitiated. K.A.E.

Related Subjects. In connection with this discussion of taste, the reader may consult the following articles in these volumes:

Mouth
Senses, Special

Smell
Tongue

TATARS, *tah' tahrz*. See TARTARS.

TATE, NAHUM. See POET LAUREATE.

TATTOOING, the savage art of making permanent scars in patterns on the skin. It originated as a purely decorative custom, but among some races it grew to have a religious or tribal significance. Real tattooing can be practiced successfully only by light-skinned people, for it includes rubbing colors into freshly made abrasions of the skin. Needles of steel, bone, or shell are used to puncture the designs in groups of lines and dots, and one or several colors are employed to set the patterns permanently. The Polynesians confine themselves to black pigment, which turns to blue in the skin, but the Japanese use three or four colors. Dark-skinned races practice a related art, *scarification*, or gashing the skin and rubbing in ashes, charcoal, or clay, which causes light, raised scars. Another method, known as *branding*, consists in inserting splinters of wood in the skin and setting them afire.

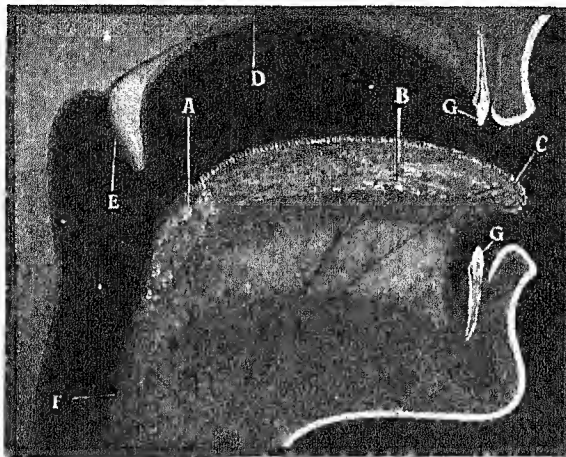
As civilization spreads, tattooing dies out, though sailors often have designs, usually of nautical subjects, tattooed on the body.

TAUGHANNOCK, *taw gan' uh*, FALLS, a 215-foot waterfall near Ithaca, N. Y.

TAUNTON, Mass. See MASSACHUSETTS (back of map).

TAURUS, *taw' rus*, THE BULL, the second sign of the zodiac, into which the sun enters about April 20. The symbol of this sign is ♉. The constellation Taurus contains, altogether,

about 140 stars visible to the naked eye; in the northern hemisphere, it is overhead in December and January. The most remarkable star is Aldebaran, a red star of the first magnitude, which is shown in the illustration, blazing in the head of the Bull. The V-shaped cluster of Hyades forms the face of the Bull, and the beautiful group of the Pleiades is also in this constellation. In the Pleiades are very many stars, but only six are visible to the naked

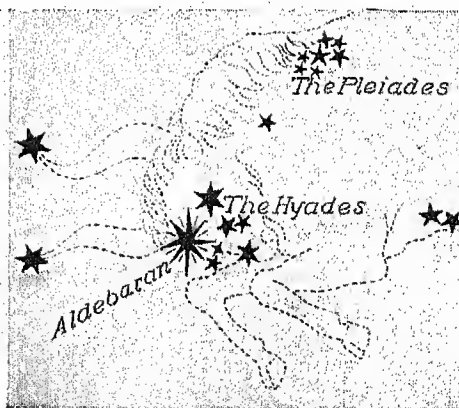


THE SENSE OF TASTE

(A) Ends of the nerves for bitter tastes. (B) Ends of nerves for sour taste. (C) Ends of nerves for sweet taste. (D) Roof of mouth, for registering sensations of heat and cold. (E) Palate end for stoppage of heat and cold. (F) Nerves leading to brain. (G) Tooth.

eye, the brightest being called Alcyone. See PLEIADES.

In Mythology. The Bull, according to legends, is the bull into which Jupiter transformed himself when he carried away Europa, who became mother of Minos and grandmother of Deucalion, corresponding



THE CONSTELLATION TAURUS

The sizes of the stars indicate their relative magnitude.

to the Noah of the Deluge. In the ancient astronomy of India and Chaldea, the Bull also appears long before the Greek era. The Pleiades were the seven daughters of Atlas, all immortal except one, who gave up her immortality for love of a man, and whose brightness has vanished. The Hyades were half sisters of the Pleiades.

F.B.L.

[For additional illustration showing position of the constellation in the heavens, see ASTRONOMY.]

TAURUS, mountain ranges in southern Asia Minor, extending along the Mediterranean coast from the Euphrates River in the direction of the Aegean Sea. The mountains form the southern boundary of the Anatolian plateau, which occupies the central part of Asia Minor. Many peaks more than 10,000 feet in altitude rise in the Taurus. The northeast extension is known as the Anti-Taurus. See **TURKEY** (The Land and Rivers).

TAVERN. See **COLONIAL LIFE IN AMERICA** (Taverns).

TAX AND TAXES. A tax is a compulsory contribution, exacted by public authority according to some general rule but without reference to the special benefits conferred by the services on the individual taxpayer. Every nation or government unit must have funds with which to meet its expenses, such as the provision of education, the protection of life and property, and the construction of public improvements. These funds are obtained largely through taxation of the people.

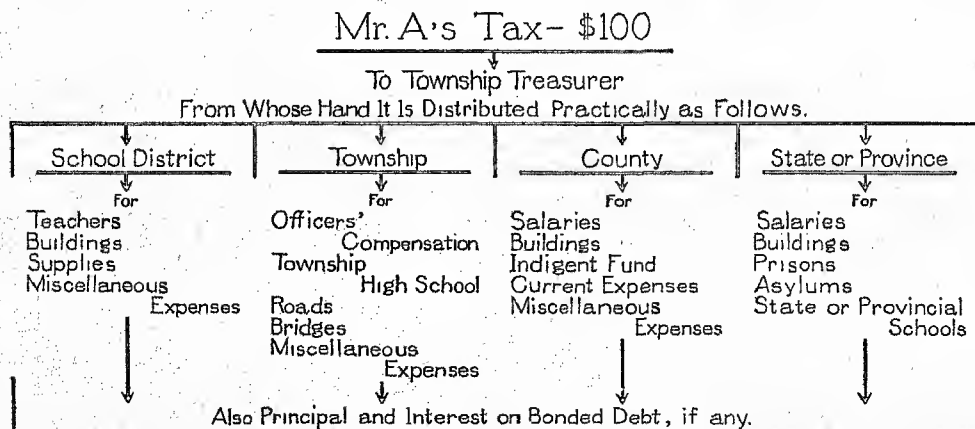
Taxation as a means of obtaining revenue has been employed from the earliest days of civilization. Many inscriptions testify that taxes were collected in Babylonia, Egypt, and other countries of antiquity, while in both the Old and the New Testament there is frequent reference to taxgatherers, or "publicans." In Europe, during the Middle Ages, most governments were supported chiefly from the income of lands owned by the government (public or national domain) or by the ruler himself; there were some regular taxes and numerous special fees, but a state system of taxation was practically unknown. In the European cities of the period, however, local taxes were collected with considerable system and regularity, and in many of these centers, only taxpayers were allowed privileges of citizenship.

Kinds of Taxes. Taxes are of two principal

kinds, *direct* and *indirect*. A tax which is not regularly shifted, but is borne by the person on whom it is imposed, is a direct tax; whereas a tax which is regularly shifted, by the person on whom it is imposed, upon others, who eventually pay it, is called an indirect tax. Our state and local governments, as well as the federal government, make use of both direct and indirect taxes.

The simplest kind of direct tax is a *poll tax*, literally a tax *per head*. Such a tax is levied upon individuals, without reference to their property or employment. It was once an important source of revenue but, except in the South, has been largely abandoned. The most important types of direct taxes in use today are those levied on *real estate* and *personal property*, and on *incomes*. In earlier days, when our economic structure was less complex, the tax on real estate and personal property (the *general property tax*) was regarded as reasonably equitable, because each person taxed paid roughly according to his means. But in our modern, highly developed form of society, there is opportunity for much evasion; large amounts of personal property—notably stocks and bonds, which are easily concealed from taxing bodies—escape taxation entirely. The advocates of the *single tax* (which see) maintain that such evasion would be impossible under a just system of taxation, but none the less it is to be anticipated that the general property tax will continue to be one of the main sources of revenue for state and local governments. The *income tax* (which see) is an exceedingly important revenue producer. Another important tax classified by economists as a direct tax is the *inheritance tax*. This levy offers excellent opportunities for improving the distribution of wealth.

Indirect taxes are also an exceedingly important source of revenue, especially for the federal government. Indirect taxes include, chiefly, duties imposed on imported goods



(customs duties), and taxes on the manufacture or sale of goods (excise and sales taxes).

Principles of Taxation. It is just that a citizen should pay revenue to a government that protects him in the enjoyment of his life, liberty, and property. During the eighteenth century the view was quite generally held that taxation was the price of protection. The attempt was therefore made to base taxes on the benefit received, or on the expense incurred by the state in providing the necessary protection. This theory was defective because the benefit (or expense) could not be accurately determined, and because there was an utter lack of correspondence between benefit received and ability to pay therefor. Nowadays the basis theory of taxation is that each person should contribute in proportion to his means and ability. The obligation to pay taxes is not derived from benefits received, but arises out of the duty of every person to support the state of which he is a member.

A good system of taxation has other characteristics than mere recognition of ability to pay. The amount, time, and manner of payment should be made clear to the taxpayer, so that he can arrange to meet the tax and need not be subject to the whims of the tax collector. The convenience of the taxpayer should be consulted; the time and place of payment should be arranged so as not to put him to unnecessary inconvenience. The cost of collection should be relatively low. The tax should be reasonably productive and capable of being fairly administered. Moreover, the tax system as a whole should provide elasticity, so that more or less revenue can be obtained, according to the requirements.

State and Local Taxation. In the United States the states and local governments obtain most of their revenues from direct taxes, though recently there has been a decided resort to the sales tax, which is an indirect tax in the main. All of the states have a general property tax (which is largely, though not entirely, a direct tax), nearly all have an inheritance tax, and about two-fifths of them have an income tax. In nearly all of the states, if not all, the chief source of revenue for the various units of government is the general property tax.

Before revenue can be obtained from property taxes, two fundamental questions must be answered—first, what is the value of the tax-

able property; and second, how much revenue is needed. The first question is answered by the assessors. Ordinarily the assessors in each community prepare complete statements of all the taxable property owned by the people of that community. Sometimes, also, the owners of property are required to file with the assessors sworn "lists" of their taxable property. On the basis of such data the assessors fix the value of the property. If the owner feels that the assessed valuation is too high, he can ask the board of review to reduce it.

The second question is not answered so easily, because the tax paid by an owner, whom we may call Mr. A, is distributed among several governmental units approximately in the manner indicated in the diagram which appears on the opposite page.

The most important man in this system is the township treasurer (in some states, however, the taxes are paid to the county collector or treasurer). All taxes are paid first to him, and are properly distributed by him. The taxpayers of a township must first pay the expenses of their township. But each township, being a part of the county, bears its share of the expenses of county government. The state, too, calls on each county for its share of the funds which shall maintain the state government. The amount of money which each unit is required to pay to the next higher unit is determined by the county board and state board of equalization, in proportion to the taxable property in each unit. Thus the state is really supported by the counties, which are supported in turn by the townships. It must be remembered, however, that the county and the township are created by the state; they tax in their own name, but they derive their authority from the state. The total amount needed for all purposes, divided by the assessed value of the property in the state, determines the tax rate; for example, if \$1,000,000 is needed for all expenses, and if the value of all property is

\$200,000,000, the tax rate is $\frac{1,000,000}{200,000,000}$, or $\frac{1}{200}$,

or one-half of 1 per cent. Standing somewhat aside from these other units is the school district, which is a division of the township or county for school purposes; in practically all states, the voters in a school district pay special taxes for the support of the schools in that district.

E.J.

The Mathematics of Taxes

The amount of tax levied by the government depends upon the expenses it must meet. The rate of tax depends upon the expenses to be met and the value of the property to be taxed. For example, the town of D has taxable prop-

erty assessed at \$10,000,000, and the tax to be raised is \$275,000. The rate of tax is $2\frac{3}{4}\%$, or $2\frac{3}{4}$ cents on the dollar, or $27\frac{1}{2}$ mills on the dollar. The rate is the relation of tax to the assessed value of the property, as shown below:

$$\text{Rate} = \frac{275000.00}{1000000} = \frac{275}{10,000} = 2\frac{3}{4}\%$$

$$\text{Tax on \$1} = \frac{\$275,000.00}{10,000,000} = \$.02\frac{3}{4}$$

In the town of D, a person owning property assessed at \$16,500 will pay in taxes .02 $\frac{3}{4}$ of \$16,500, or \$453.75.

Problems. 1. There is to be raised in a certain town for a new school a tax of \$8000; the assessed valuation of property is \$400,000. What is the rate of taxation? What is the tax of Mr. James, who owns property assessed at \$1,350?

SOLUTION

$$\text{Tax} = \$8000$$

$$\text{Assessed valuation} = \$400,000$$

$$\text{Rate of tax} = \frac{8000}{400000} = 2\%$$

$$\text{Mr. J's tax} = .02 \text{ of } \$1,350 = \$27$$

2. In a certain large city, the tax needed was as follows: for the state \$1,300,150, for the county \$1,800,000, for the city \$5,478,300, for the schools \$6,000,000, for the parks \$1,500,800. The city property was valued in full at \$1,286,340,000. Property was taxed on $\frac{1}{5}$ of full value. What was the rate of taxation? What was the tax of Mr. N, who had property valued at \$7500, full value?

SOLUTION

State tax.....	\$ 1,300,150
County tax.....	1,800,000
City tax.....	5,478,300
School tax.....	6,000,000
Park tax.....	1,500,800
Total.....	\$16,079,250

$$\text{Assessed property value} = \frac{\$1,286,340,000}{5} = \$257,268,000$$

$$\text{Rate} = \frac{\$16,079,250.00}{\$257,268,000} = .06\frac{1}{4}$$

$$\text{The assessed value of Mr. N's property} = \frac{\$7500}{5} = \$1500$$

$$\text{Mr. N's tax} = .06\frac{1}{4} \text{ of } \$1500 = \$93.75$$

3. In the town of E, a tax of \$20,000 is needed; there are 380 polls, each paying \$2. How large a property tax must be raised? Ans. \$19,240.

4. If the rate of tax is \$13 on every thousand dollars' valuation, what is the tax of a person owning property valued at \$7,000? Ans. \$91.

5. At \$1.75 on \$100, what is the rate of tax in per cent? What is the tax on property assessed at \$8000? Ans. 1 $\frac{3}{4}$ %; \$140.

6. The rate of state tax is 1 mill, of county tax 3 $\frac{1}{2}$ mills, of town tax 4 mills. What is the tax of a property owner in that town on property assessed at \$8000?

SOLUTION

$$\text{Rate} = .008\frac{1}{2}$$

$$\text{Tax} = .008\frac{1}{2} \times \$8,000 = \$68$$

Problems Involving Duties. 1. What is the duty on a shipment of perfumery bought in Paris for \$420, weighing 125 pounds, ad valorem duty 50% and specific duty \$.60 per pound?

SOLUTION

$$\begin{aligned} \text{Invoice price} &= \$420 \\ \text{Ad valorem duty} &= .50 \times \$420 = \$210 \\ \text{Specific duty} &= 125 \times \$.60 = \$ 75 \\ \text{Total duty} &= \$285 \end{aligned}$$

2. The duty on canned fish is 30%. What is the cost to the merchant of importing a lot of sardines costing \$625 in Italy?

$$\begin{aligned} \text{Invoice price} &= \$625.00 \\ \text{Ad valorem duty} &= .30 \times \$625 = 187.50 \\ \text{Total cost} &= \$812.50 \end{aligned}$$

3. The ad valorem duty on a shipment of gloves at 60% was \$172.50. What was the invoice price of the lot?

$$\begin{aligned} \text{Ad valorem} &= \$172.50 \\ \text{Rate} &= 60\% \\ \$172.50 &= .60 \times \text{invoice price} \\ \text{Invoice price} &= \frac{\$172.50}{.60} = \$287.50 \end{aligned}$$

Teaching Suggestions. Students should have an intelligent grasp of the civil, social, and industrial conditions that give rise to tax problems.

Related Subjects. See the articles listed below:

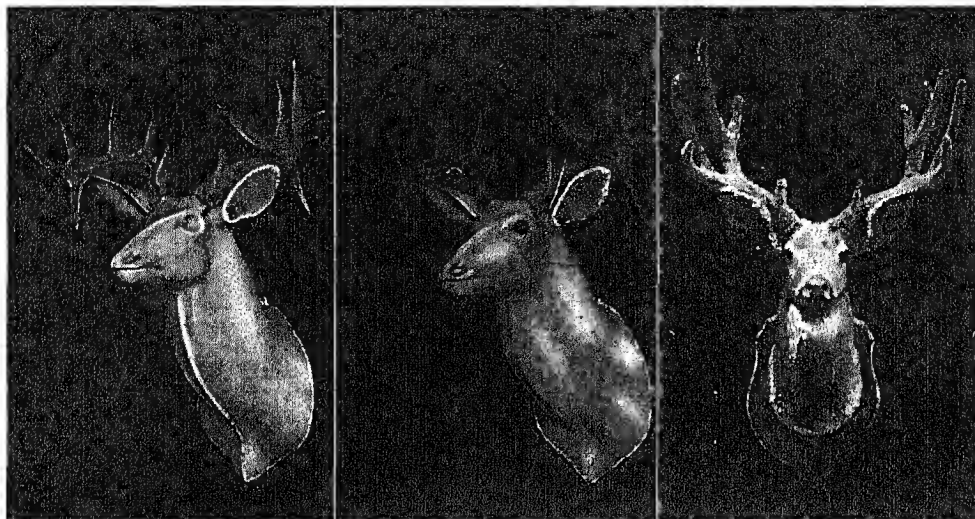
Assessor	Internal Revenue
Customs Duties	Poll Tax
Economics	Sales Tax
Free Trade	Single Tax
Income Tax	Social Security Act
Inheritance Tax	Tariff

TAX APPEALS, UNITED STATES BOARD OF, is an agency functioning in the interest of equitable income taxation. Federal income tax reports are sent to the commissioner of internal revenue, who examines them carefully. When a report of taxable income appears too low a notice to that effect is sent to the taxpayer. If, after going over the report again, the taxpayer considers it fair and correct, but the commissioner still declares it deficient, it may be taken to the Board of Tax Appeals. Where Board decisions are not satisfactory, the taxpayer has further recourse to a United States Circuit Court of Appeals, and finally, to the Supreme Court.

Comprised of sixteen members appointed by the president (with the advice and consent of the Senate) in groups of four, the Board was created in 1924 and has functioned independently since 1926. Tenure is for twelve years.

TAXATION WITHOUT REPRESENTATION. See REVOLUTIONARY WAR IN AMERICA (Causes of the War).

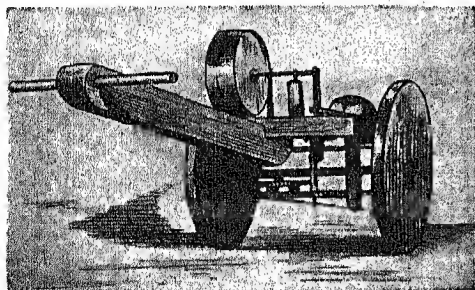
TAXICAB, tak' sih kab, a public motor vehicle used chiefly in cities to carry passengers for hire. It is an example of specialization in automobile-making, and has taken the place of the cab or coach drawn by horses. High-grade taxicabs are fitted with all possible comforts for the passengers, such as drop seats



MOUNTING THE HEAD OF A DEER

From left to right: Plaster cast of head, made after skin was removed; the same, with eyes inserted; the complete job, with skin, velvet antlers, and board mount.

for children, side pockets for papers and programs, cigar lighters, and electric lights. These vehicles are equipped with *taximeters*, automatic devices which register the mileage covered and record the amount of the fare. Maximum rates are fixed by city ordinances, and fares are collected on the basis of the distance covered, or according to the time con-



AN EARLY TAXICAB

A Chinese public conveyance, three centuries old. It was provided with a mechanical register in the form of a drum, which was beaten by a hammer at the end of each mile.

sumed. There are other regulations as to number of passengers, seating capacity of vehicle, time used in waiting for passengers, time lost because of breakdowns, insurance requirements, etc.

Generally speaking, rates in Europe are lower than in the United States, partly because there are very many more privately owned automobiles in the latter country than anywhere in Europe, but largely because of America's higher standard of living. Paris

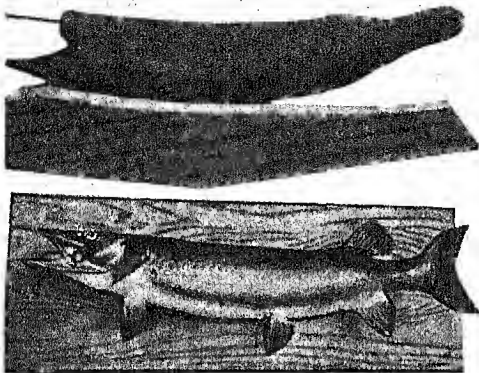
is famous for the cheapness and excellence of its taxicab service.

TAXIDERMY, *tak' sih dur mic*. The visitor in a zoölogical museum is usually impressed by the natural appearance of the mounted animals exhibited. Often these are shown much as they lived in their native haunts; that is, in a picturesque setting of woods or water. Birds, fish, squirrels, larger common woodland mammals, and wild beasts of the jungle, even elephants, are exhibited in a most realistic manner. The science by which animals are thus preserved and represented is known as *taxidermy*.

As taught at the present time, taxidermy is a complicated art which requires a considerable knowledge of anatomy, natural history, drawing, modeling, carving, sculpture, mechanics, tanning, and dyeing. Ward's Natural Science Institute, at Rochester, N. Y., is the most famous taxidermic school in the United States, and most of the American museum experts have been graduated from this establishment. An excellent taxidermic department is also maintained by the United States National Museum, at Washington. Some of the world's greatest experts in taxidermy are connected with the American Museum of Natural History in New York City.

The complete process of mounting, in general, is as follows: Accurate measurements of the skin are made, and a drawing is worked out which shows the location of muscles, ribs, and hollows. This copy is used as a guide. Next a manikin corresponding to the body of the animal is constructed by covering a framework of wire and excelsior with clay, plaster,

or papier-mâché. The modeling of such a figure must be done as carefully as if it were intended to be a sculptor's model. By means of a special method of cutting, the skin is removed from the body, even to the ends of the toes and the tips of the ears. This stripping is done so skilfully that there is no injury or disfigurement of the fur, hair, feathers, or scales, as the case may be. After the skin is removed, it is treated with some preservative



HOW A FISH IS MOUNTED

The body is made of one-inch pieces of wallboard, glued together, cut out with a band saw, and shaped on a buffing lathe. The work is completed by stretching the skin over the wallboard body.

compound, such as arsenical soap. Finally, the skin is put on the manikin, and is carefully sewed together at the points where slits were made in stripping it from the body.

The details as to shaping the ears, putting in the eyes, tongue, lips, etc., and otherwise accurately reproducing the animal, are numerous and complicated. Glass eyes are no longer used; they have been replaced by hollow globes, painted so as to give a natural expression.

Derivation. The word taxidermy is derived from two Greek words meaning *arrangement* and *skin*.

TAXONOMY, *tak sahn' o mie*. See CLASSIFICATION; BOTANY (Organized Botany).

TAYGETA, *tay ij' e tak*. See PLEIADES.

TAYLOR, [JAMES] BAYARD (1825-1878), an American poet, essayist, and traveler, was born at Kennett Square, Pa., of Quaker ancestors. He received only a high-school education, and began life as a printer. When but nineteen years old, he made a visit to Europe, in the course of which he tramped from place to place and supported himself by writing letters, which were afterward published in book form under the title *Views Afoot*. He was a born traveler, and journeyed in his later years in Asia Minor, Egypt, China, Japan, and various countries of Europe, and wrote many volumes descriptive of the scenes and peoples he visited. During the War of Secession, he was secretary

to the legation at Saint Petersburg (the present Leningrad), and in 1878 became United States minister to Germany. He died in Berlin.

Taylor's most famous work is his translation of Goethe's *Faust*, which is probably the best in the English language. It was, however, his travel volumes which won him widest reputation during his life, and for which he is most generally remembered. His own great ambition was to be known as a poet; but, while his works all show poetic talent, and some of them, as the *Bedouin Song*, have retained their popularity, they lack the indescribable quality that would make them really great.



Photo: Brown Bros.

BAYARD TAYLOR

What He Wrote. Among his writings are *El Dorado*, a description of California in the days of gold-seeking; *By-Ways of Europe*; *A Visit to India, China, and Japan*; four novels, of which *Hannah Thurston* is the best; and the volumes of poems: *A Book of Romances*, *Lyrics*, and *Songs*; *Poems of the Orient*; *Lars, a Pastoral of Norway*; *The National Ode*; and *Prince Deucalion*.

TAYLOR, JEREMY (1613-1667), a famous English preacher and author, born at Cambridge and educated at Caius College, Cambridge University. Gaining the favorable notice of William Laud (which see), he was accorded a fellowship at All Souls, Oxford, and was made chaplain to Charles I. To the latter's cause he remained loyal throughout all the years of the Civil War, which ended in the execution of the king in 1649.

Before the outbreak of the struggle, he had been appointed rector of Uppingham, but he lost that post, and during the early part of the war was in the royal army as chaplain. For a time he was imprisoned in Wales, and after his release remained in that country, teaching school and writing. At the Restoration, he was made bishop of Down and Connor, in Ireland. Notwithstanding the fact that his position there was rendered unpleasant, he remained, faithful to his duties, until his death.

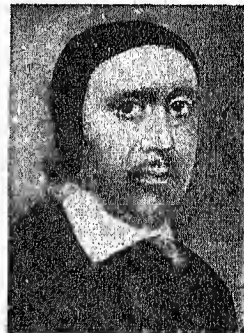


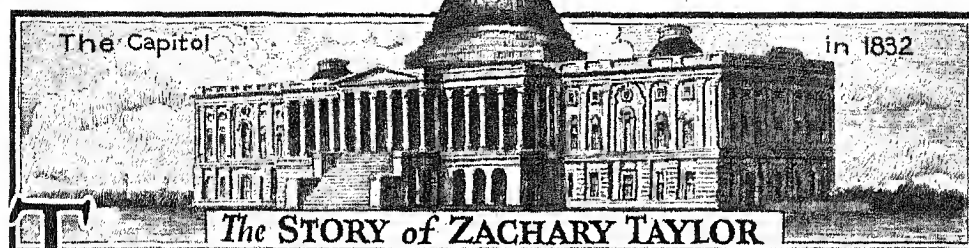
Photo: Brown Bros.

JEREMY TAYLOR

His Writings. His most famous works are *The Liberty of Prophesying*, *Great Exemplar*, *a History of Jesus Christ*, *Holy Living*, and *Holy Dying*. These, as well as his sermons, are models of eloquence, and they abound in poetic imagery and evidences of a rich and fertile imagination.

TAYLOR, JOSEPH W., the founder of Bryn Mawr College (which see), a prominent institution for the higher education of women.

TAYLOR, PA. See PENNSYLVANIA (back of map).



TAYLOR, ZACHARY (1784-1850), an American soldier, whom the fortunes of war elevated to the highest American honor, making him the twelfth President of the United States. Taylor was the second President to die in office, William Henry Harrison, the first, having died only nine years earlier. Taylor's untimely death, coming only sixteen months after his inauguration, cut off his political career at its very beginning, for he had held no political office of any kind previous to the Presidency. He was a soldier for forty years, and it was his reputation as the hero of the Mexican War that was the decisive factor in making him President. Without political training, he saved himself through his courage, his conscientiousness, and his good judgment. These carried him through difficulties in which the training of the politician would have been worthless. Conscious of his inexperience, he relied on the advice of others, but his judgment kept him steady amid confusing, conflicting counsels. Had he lived to serve out his term, the soldier would almost surely have proved himself a statesman of a high order.

Zachary Taylor was born in Orange County, Va., on November 24, 1784. He was the third son of Colonel Richard Taylor, a Revolutionary officer. At the close of the war, Colonel Taylor retired to his Orange County plantation, but in 1785 he removed to Kentucky, which was then part of Virginia, and took up a farm near the present city of Louisville. Of formal schooling young Zachary had none. The new settlement offered few opportunities for scholastic training, but it did teach thrift, industry, and self-denial. It also taught many things about war and military life, for many of Colonel Taylor's neighbors were Revolutionary soldiers who had received grants of land from Virginia. Before the colonel's wide hearth were told stories of the dark days of the Revolution, and reminiscences of brave deeds. Undoubtedly, this military past had its influence on the Taylor boys, for all but one of the five joined the army.

Early Career in the Army. During young Zachary's early manhood, the United States became involved in disputes with France and Great Britain over the rights of neutral commerce and other matters affected by the Napoleonic wars. In 1808 the status of these disputes seemed to point to immediate war with Great Britain. Congress authorized an increase in the size of the army, and in one of the new regiments, the Seventh Infantry, Zachary Taylor was appointed first lieutenant. Two years later, he was promoted to the rank of captain, and about the same time was married to Miss Margaret Smith, the daughter of a Maryland planter (see below).

In June, 1812, war was declared against England. This action made it almost certain that the Indians allied with the British would begin raids. One of the points of attack would be Vincennes, on the Wabash River. To protect Vincennes from a surprise attack, Captain Taylor, with his company of fifty men, was ordered to Fort Harrison, a stockade on the river above Vincennes. Here the little force was attacked by a large band of Indians, led by Tecumseh; it was beaten off so effectively that, for months afterward, no Indians could be found in this section. For the defense of the fort, Captain Taylor received the brevet rank of major, which was later confirmed by commission. Major Taylor was in active service against the Indians in the Wabash and Rock River valleys until the close of the war.

Indian Campaigns. At the close of hostilities, because of changes in the army organization, Taylor was reduced to the rank of captain. Regarding this as an injustice, he resigned his commission and returned home. Some influence, not stimulated by himself, secured his restoration to the rank of major. As lieutenant colonel, he later commanded at Fort Snelling, then the border post of the Northwest, and as colonel was in charge of Fort Crawford, at Prairie du Chien (Wisconsin), when the Black Hawk War began. Colonel Taylor served through the campaign, and himself re-



ceived the surrender of Black Hawk. Four years later, in 1836, he was sent to hold a command in Florida, and in 1837 defeated the Seminole Indians in the decisive Battle of Okechobee, a victory for which he received the



Photo: U & U

ZACHARY TAYLOR

One of the numerous Americans who were made national heroes by war and afterward raised to high civil office.

brevet rank of brigadier general. In 1838 he assumed chief command in Florida, and in 1840 was assigned to command the southern division of the western department of the United States army.

In the Mexican War. As the commander of this division, he was naturally given the task, in 1845, of defending Texas from threatened invasion by the Mexicans. Texas had entered the Union, so it said, with the Rio Grande as its boundary; it asked protection for this frontier, and General Taylor was to advance to that river. Collecting a force of about 4,000 men, both regulars and volunteers, at Corpus Christi, he advanced to the Rio Grande, and halted on its bank, opposite Matamoros. There the Americans built Fort Brown. General Ampudia, the Mexican commander, demanded that the Americans retire beyond the Nueces River, which they claimed as a boundary. Taylor promptly refused. In order to obtain more supplies, Taylor took half of his force to Point Isabel, his base, thirty miles away. On the

second day of the return trip, a force of 6,000 Mexicans opposed the further progress of his troops. Most of the officers were in favor of falling back to Point Isabel, to await reinforcements, but Taylor, after listening to the arguments, said: "I shall go to Fort Brown or stay in my shoes," a Western expression equivalent to "die with my boots on." Although outnumbered three to one, the Americans attacked early on the morning of May 8, 1845, and in the battles of Palo Alto and Resaca de la Palma, routed the Mexicans, who fled across the Rio Grande and left open the way to Fort Brown. On May 18 General Taylor's force occupied Matamoros.

In the meantime, on May 13, war had been formally declared. General Taylor then prepared to advance into Mexico, as the Rio Grande was an unsatisfactory strategic boundary. With 6,625 men he marched against Monterrey, which surrendered on September 24, after a three days' bombardment. By the terms of surrender, the Mexicans agreed to retire behind a certain line, and the American troops agreed not to advance beyond it for eight weeks. This armistice was not approved by the United States government. Assuming, therefore, that the government was planning a further invasion of Mexico, General Taylor made preparations to that end, and was all but ready to advance, when he learned that General Scott had arrived at Vera Cruz with orders to take such troops and supplies as he needed, from Taylor's army. This was in the spring of 1847. Scott left Taylor only 5,000 unseasoned troops, to oppose General Santa Anna's army of 20,000. Santa Anna saw his opportunity, advanced to the attack, and met Taylor at Buena Vista, to which the Americans had withdrawn. There General Taylor's army won a brilliant victory over a vastly superior force, a victory which aroused great enthusiasm and made Taylor a national hero.

As a soldier, General Taylor ranks high. In the words of one who knew him well and understood him thoroughly:

Unpretending, meditative, observant, and conclusive, he was best understood and most appreciated by those who had known him long and intimately. In a campaign he gathered information from all who approached him, however sinister their motive might be. By comparison and elimination, he gained a knowledge that was often surprising, as to the position and designs of the enemy. In battle he was vigilantly active, though quiet in bearing; calm and considerate, though stern and inflexible; but when the excitement of danger and strife had subsided, he had a father's tenderness for the wounded, and none more sincerely mourned for those who had bravely fallen in the line of their duty.

When the Mexican War was over, it seemed to General Taylor that the time had come to realize his dream of living again on a farm.

In 1842, when he took command of the southern division, he purchased a plantation near Baton Rouge, La., and later he planned to conduct a stock farm in the hills of Jefferson County. He had never felt any longing for political life, and he was always waiting for the day to come when he should be free to manage his private affairs. But his dream was not to be realized. His military career had made him a hero—"Old Rough and Ready," he was called. His popularity was seized by the Whigs to help preserve the party. As the Presidential campaign of 1848 approached, the Whigs had three possible candidates—Clay, Scott, and Taylor. Clay was still the party leader, but he had already been defeated three times. Scott had been a Presidential possibility for a quarter of a century, and there were good arguments against him.

There remained Taylor, who easily outshone Scott as the popular hero of the war. He was not the most logical candidate the Whigs might have chosen, perhaps, but he was the strongest. With him as the candidate, the Whigs won their second and last victory in a Presidential election. Taylor received 163 electoral votes to 127 votes for Lewis Cass, the Democratic candidate. The popular vote was close: 1,360,101 for Taylor to 1,220,544 for Cass. Van Buren, the Free-Soil candidate, received 291,263 popular votes, but no electoral votes. The campaign was fought without much

enthusiasm, and practically without an issue. Neither of the two great parties made an effort to rally the people to the defense of any important principle. As one historian remarks, somewhat sarcastically, practically the only



ELECTION MAP OF 1848

States in black gave their electoral votes to Lewis Cass, Democrat; cross-hatched states voted for Taylor, Whig. Gray area south of Canada and north of Mexico was unorganized territory.

thing it decided was that a Whig general should be made President, because he had done effective work in carrying on a Democratic war.

The Administration of Zachary Taylor

As President, Taylor had no friends to reward and no enemies to punish. He chose for his Cabinet men of national reputation, not one of whom was personally known to him. All the members of his Cabinet were lawyers, and all had served either in the Senate or in the House of Representatives. John M. Clayton, of Delaware, as Secretary of State, and Reverdy Johnson, of Maryland, as Attorney-General, were the best-known of the group.

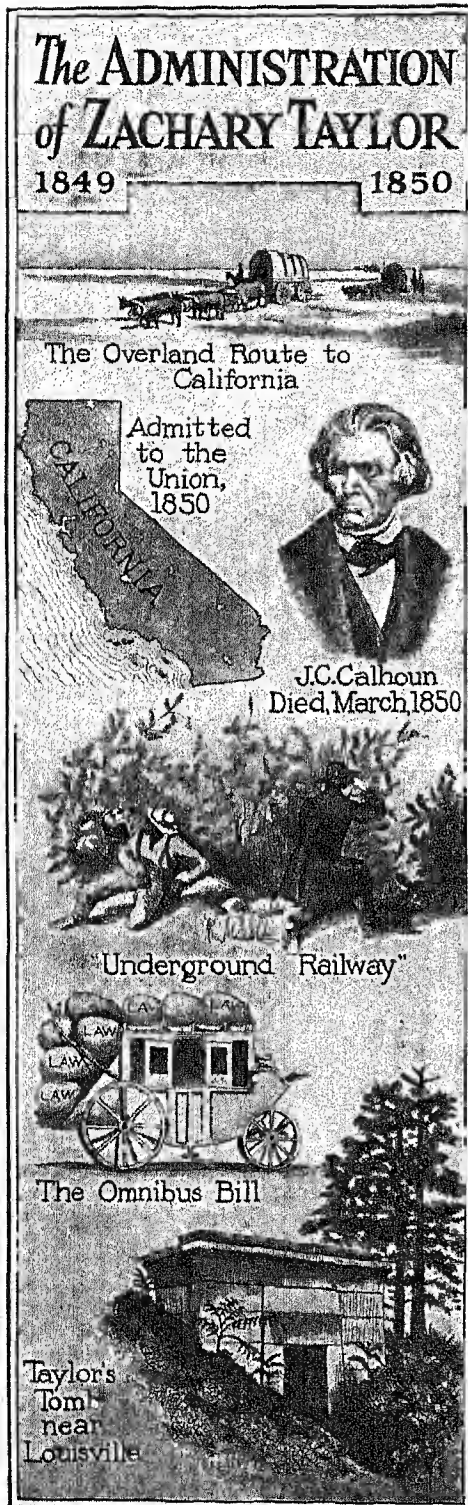
Clayton-Bulwer Treaty. The settlement of the Oregon question and the acquisition of California naturally gave a new importance to the old plan of a water route across the Isthmus of Panama. In 1849 Nicaragua granted to a company of United States capitalists a concession for an isthmian canal, on condition that the United States should guarantee the neutrality of the canal, and also the sovereignty of Nicaragua over the territory along its course. Then, in order to forestall British interference, the United States obtained the cession of the island of Tigre, in the Gulf of Fonseca, on the Pacific side from Honduras. This gulf was the probable Pacific outlet of the canal, but Great Britain already controlled the Atlantic end.

This complication made necessary a readjustment of the Anglo-American relations, and re-

sulted in the Clayton-Bulwer Treaty of 1850. By this agreement, the two nations agreed to promote a canal across Nicaragua, and neither "would ever obtain or maintain for itself any exclusive control over the said ship canal" or "assume or exercise any dominion . . . over any part of Central America." The "neutrality and security" of the canal were guaranteed so long as there should be no "unfair discriminations" or "oppressive exactions" in its management.

The Compromise of 1850. One of President Taylor's first acts was to send agents to California and New Mexico, with instructions to urge the people of those territories to frame constitutions and apply for admission to the Union as states. But before the agents reached their destination, events had already moved in the desired direction. A convention was held in California in September, 1849, and a constitution was adopted which prohibited slavery. In Taylor's annual message, sent to Congress in December, there was reference to this movement in California to organize a state government, and to the prospect of similar action in New Mexico.

The first session of the Thirty-first Congress, in December, 1849, was remarkable for a fierce



struggle over the Speakership, the difficulty lying in the fact that a small group of Free-Soilers held the balance of power, and refused to vote for either the Whig or the Democratic candidate. In the course of this contest, the fiercest sectional antagonisms were stirred up, and conservative men everywhere were becoming alarmed for the safety of the Union. It was then that Robert Toombs of Georgia said:

I do not hesitate to avow before this House and the country, and in the presence of the living God, that if by your legislation you seek to drive us from the territories of California and New Mexico, purchased by the common blood and treasure of the whole people, and to abolish slavery in this district, thereby attempting to fix a national degradation upon half the states of this Confederacy, I am for disunion.

In this grave crisis, Henry Clay appeared in the Senate for the last magnificent effort of his career. On January 29, 1850, he introduced into the Senate eight resolutions, which, with some amendments, stand in history as the Compromise of 1850. Clay's great speech in support of the resolutions was made on February 5 and 6. Calhoun's reply came on March 4. It was read by Senator James Murray Mason of Virginia, for Calhoun was at the grave's edge and too weak to deliver it, but the veteran sat bravely in his seat. It was Calhoun's last public work; he died on March 31. Three days after Calhoun's speech, Webster delivered the Seventh of March speech, and in later weeks William H. Seward and Salmon P. Chase, newcomers in the Senate, were heard.

In April the resolutions were referred to a committee of which Clay was chairman, and on May 8 the committee reported two bills which would accomplish all that Clay wanted. One of these measures, the "Omnibus Bill," provided for the admission of California, for the organization of New Mexico and Utah as territories, and for a Texas boundary which would exclude any territory claimed by that state in New Mexico. The second bill provided for the suppression of the slave trade in the District of Columbia, and for a more effective enforcement of the Fugitive Slave Law. Before much progress was made with these bills, Taylor died suddenly, on July 9, 1850, after an illness of four days. His remains were placed in the family cemetery near Louisville, Ky. The succession fell to Vice-President Millard Fillmore.

The two bills as drafted by Clay met little favor in Congress, but their substance was finally recognized as the necessary compromise. Special bills on each feature of the compromise were passed, in most cases by a large majority. Thus the final decision as to peace or war was postponed for another decade, when the fires which had flamed fitfully from time to time became a steady blaze. In that greater conflict,

OUTLINE AND QUESTIONS ON ZACHARY TAYLOR

Outline

I. Early Years

- (1) Birth and parentage
- (2) Lack of education
- (3) Effect of "war stories" in determining choice of vocation

II. Military Career

- (1) Appointment as first lieutenant
- (2) War of 1812
 - (a) Defense of Vincennes
 - (b) Made major by brevet
- (3) Indian warfare
 - (a) Reduction and re-promotion
 - (b) Black Hawk War
 - (c) War against Seminoles
- (4) The Mexican War
 - (a) Assigned defense of Texas
 - (b) Encampment on Rio Grande
 - (c) Battles of Palo Alto and Resaca de la Palma
 1. Superior Mexican forces
 - (d) Occupation of Matamoras
 - (e) Capture of Monterey
 - (f) Coming of General Scott
 - (g) Battle of Buena Vista
 1. Superior Mexican force
 - (h) Victories factor in determining future career

III. Election of 1848

- (1) Possible Whig candidates
 - (a) Reason for choice of Taylor
- (2) Absence of sharp campaign
- (3) Victory of Taylor

IV. Administration

- (1) Choice of Cabinet
- (2) Treaty with Nicaragua
- (3) The Clayton-Bulwer Treaty
 - (a) "Neutrality and security" of isthmian canal guaranteed
- (4) Compromise of 1850
 - (a) Rising public sentiment
 - (b) Great speeches on the question
 - (c) Terms of Compromise
 1. California admitted as free state
 2. New Mexico and Utah organized as territories
 3. Slave trade suppressed in District of Columbia
 4. Fugitive Slave Law enforced
 - (d) Immediate results
 - (e) Later effects
- (5) Death of President

V. Summary

- (1) Character of Taylor
- (2) Rank as soldier
- (3) Political possibilities

Questions

What does the expression "stay in my shoes" mean, and under what circumstances did Taylor make use of it?

Quote from a speech which indicates clearly the degree to which a feeling of animosity between North and South on the slavery question had increased.

How did Taylor's rise to the Presidency resemble that of Grant? How did it differ from that of Harrison?

What connection did the head of the Confederacy have with Zachary Taylor?

What statesman during this administration wrote a great speech, but was too weak to deliver it?

What was the occasion of this speech, and what other famous statesmen took part in the controversy?

With what famous Indian chief did Taylor come into conflict?

What battle really won for Taylor the Presidency, and what were the circumstances that made this battle such a triumph?

What was Taylor's popular nickname?

How did a treaty with Nicaragua make necessary a treaty with Great Britain, and what were its terms?

What characteristics of Zachary Taylor enabled him to serve creditably as President, though not a politician?

President Taylor's only son, Richard (1826-1879), played a conspicuous part as a Confederate general. His son-in-law, the husband of Sarah Taylor, was Jefferson Davis. E.D.F.

Margaret Smith Taylor (1788-1852), the daughter of Walter Smith, a Maryland planter. When she entered the White House, she had probably had more varied experiences than any other President's wife. For years she shared with her husband the hardships of a frontier soldier. It was during this time that her five daughters and one son were born, and as soon as each child was old enough, it was sent back to the safety and educational advantages of the "settlements."

When the Taylors settled at Baton Rouge, where they could be united as a family, it was with no thought that war with Mexico was to focus on their quiet border, and that its events would make General Taylor a popular national hero.

Margaret Taylor's reluctance to assume responsibility in the life of the White House was criticized by her husband's enemies, but she consistently refused, and the mistress of the mansion was her daughter, "Miss Betty Taylor," wife of Major W. W. Bliss. The death of President Taylor occurred in the White House, and Mrs. Taylor survived him only two years, dying at the home of her only son, in Louisiana.

Sarah Knox Taylor married Jefferson Davis, against her parents' wishes, and died before a reconciliation with her father was effected.

Related Subjects. The reader who desires additional information respecting events connected with the life and times of this President is referred in these volumes to the following articles:

Black Hawk
Calhoun, John C.
Clay, Henry
Clayton-Bulwer Treaty
Compromise of 1850
Fillmore, Millard
Fugitive Slave Laws
Mexican War

Nicaragua Canal
Political Parties
Santa Anna, Antonio
Lopez de
Scott, Winfield
Tecumseh
United States
(History)

TAY RIVER, one of the most beautiful streams of Scotland. It rises in Ben Lui in western Scotland and flows northeast between rugged mountains and through Loch Tay, a narrow body of water some fifteen miles long, one mile wide, and in places about 500 feet deep. Following a general southeasterly course, the Tay River reaches its estuary, the Firth of Tay, covering in all 120 miles. Before the stream enters Loch Tay, it is known as the Dochart River.

The cities of Dunkeld, Aberfeldy, and Perth are on the river proper, while Dundee is located on the north side of the estuary. A railroad

bridge two miles long, and supported by seventy-three pairs of piers, spans the Firth of Tay at Dundee. The first bridge across this wide estuary was washed out, and the present bridge was built between 1883 and 1888. The river is navigable to Dundee for large vessels, while small ships can reach Perth. See SCOTLAND (Rivers and Lakes). J.G.H.

TCHAD, *chahd*, a form of the word *Chad* (which see).

TCHAIKOVSKY, *chi kawf' ske*, PETER ILVITCH. See TSCHAIKOVSKY, PETER ILVITCH.

TCHERKESES, *chur kes' ez*. See CIRCASSIANS.

TEA, a beverage brewed from the leaves of an Oriental evergreen tree, in popularity yielding only to coffee, among unfermented drinks. Millions of people in all parts of the world use it daily, and it can almost be called the national beverage of Japan, of China, and of England. For many years, it has been the custom of the English to partake, in the afternoon, of a social cup of tea. English fiction abounds in references to tea-drinking, and this indicates its place in the life of the people. When Japan and Russia contended for supremacy in northeastern Asia, in 1904-1905, the Japanese effectually warded off disease by drinking tea instead of water, for in war zones it is difficult to obtain the latter in a pure condition; tea, on the other hand, is a sterilized drink. In Japan itself, social tea-drinking is a ceremony having definite rules of etiquette.

Tea is associated with much that is delightful in life, but, like many other good things, it should be enjoyed in moderation. Its two principal constituents are caffeine and tannin (see these titles). The former is mildly stimulating in small amounts, but produces injurious effects on the nervous system when taken in large quantities. Tannin is a poisonous principle, and it is not soluble in water, except when boiling is carried on for a long time. If one pours boiling water on the leaves, and then pours out the tea as soon as it has acquired the desired strength and flavor, the beverage will not have the bitter taste that reveals the presence of tannin. When tea is properly made and is not drunk to excess, it is harmless for most adult people. It may be served either as a hot beverage or iced.

The Tea Plant. Under cultivation, the tea plant, which belongs to the same family as the camellia, is a branching shrub from two to six feet in height. On tea plantations, it is kept to small size by constant pruning, for the purpose of increasing the number of leaves, but in its natural state, it grows as a tree thirty feet or more in height. The tea gardens or estates are planted to small bushes four or five inches high, which have been grown from seeds in nurseries. The small plants are set close together in rows, sometimes as many as 1,500 to



Photo: U & U

MARGARET SMITH TAYLOR

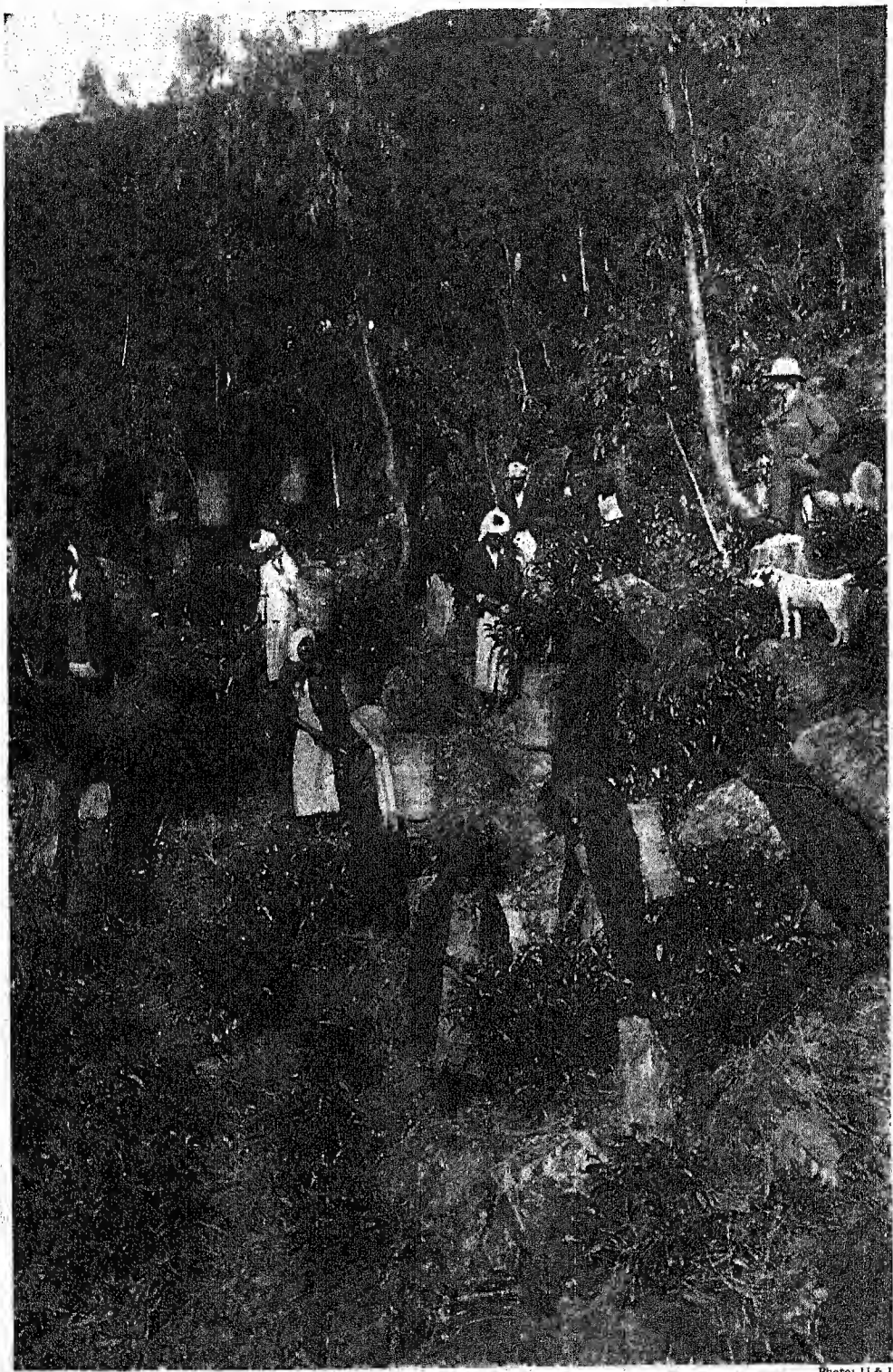


Photo: U & U

In Southern India. Native tea-pickers work about twelve hours a day, and for this arduous labor receive the equivalent of less than thirty cents.

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the acre. At the end of three years, a bush begins to be commercially profitable, but does not produce a full crop for at least two years more.

The chief tea-growing countries are India and Ceylon, the Dutch East Indies, China, and Japan and Formosa. An abundance of rainfall and a hot climate are especially favorable to the production of this plant. In Japan and China, the plants are grown in comparatively small gardens, but in Java, Ceylon, and India, there are vast estates, some of which produce more than a million pounds of tea a year. In Ceylon, India, and Formosa, where warm weather always prevails, picking may occur as often as once a month; in cooler climates, two to four times a year.

A field in full blossom is a charming sight, for the rose-colored or cream-white flowers are very lovely against the background of green stems and thick foliage. The leaves of the plant are long and leathery, somewhat resembling those of the willow tree. The finest quality

of tea is yielded by the young, tender leaves closest to the end of the branches, while the older and coarser ones, nearer the trunk of the shrub, are utilized for cheap brands.

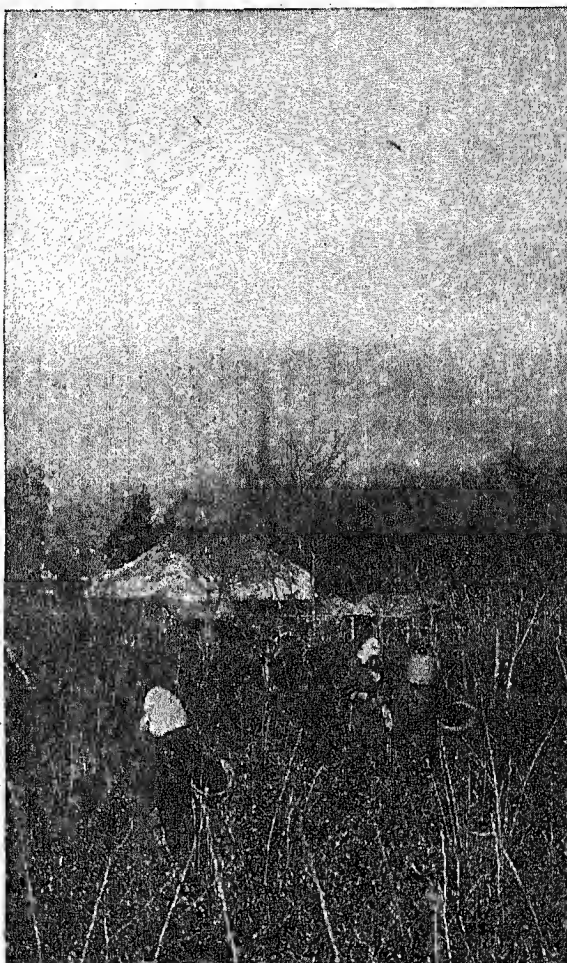
Preparation for the Market. The first step in the manufacture of tea is the picking of the leaves. This is done entirely by hand, and it is a work in which men, women, and children engage. The leaves are dropped into baskets suspended from the shoulders of the workers. As the baskets are filled, the leaves are taken to the factory for curing. It is a somewhat prevalent idea that black tea and green tea are produced by two different varieties of

plant, but the difference is wholly a matter of preparation. The green variety is what makers call *unfermented* tea, and the black is *fermented*. Fermentation, in this instance, means about the same as oxidation—the leaves re-

maining in the open air from twenty to thirty hours. In the case of fermented tea, certain oxidizing ferments in the leaf are permitted to remain in it. These ferments work chemical changes in the leaf, that give it its black color. At a certain stage in the process, when the organic nature of the leaf is on the point of being entirely changed, the fermentation is checked by the application of heat. In case of unfermented tea, the leaves are placed in a firing machine shortly after they are plucked, which prevents fermentation by closing the pores.

In black-tea preparation, the freshly plucked leaves are placed under cover on bamboo, canvas, or wire-netting trays, and left there for a day or two, to wilt. After this, they are

crushed by being passed through powerful rolling machines, a process which brings the natural juices to the surface. The leaves are then spread out on tables, in cool, well-ventilated rooms, to ferment, as described above, after which they are again rolled, and then dried in the firing machines. Cutting machines now break up the pieces into uniform lengths, and the tea is finally sifted, graded, and packed for shipment. Green tea is fired twice, the second firing occurring as soon as the leaves are taken from the rolling machines. The heating process drives off water present in the leaf and brings out the natural fragrance of the tea. Some



NEAR THE SNOW-CAPPED CONE OF FUJIYAMA
Tea-pickers in a beautiful setting near the Sacred Mountain.



Photo: U & U

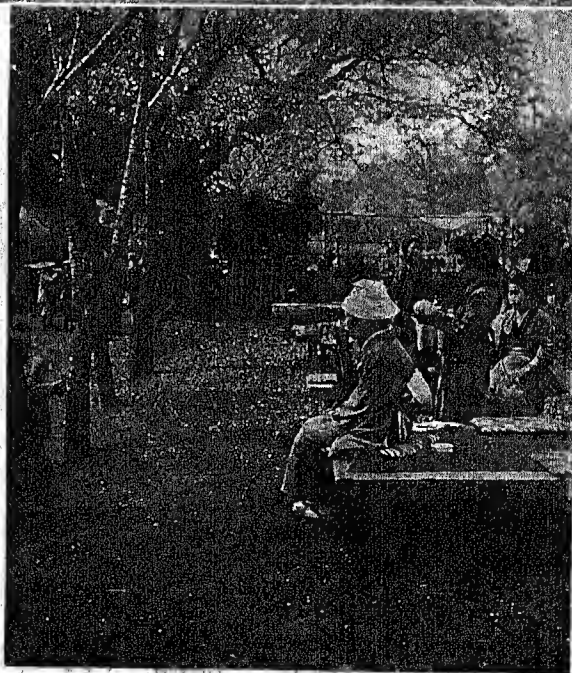
Luncheon Time in an India Tea Field. Native girls resting from their labor beneath the welcome shade of beautiful arica palms.



teas are artificially scented by exposure to fresh flowers, and cheaper grades of green tea are frequently adulterated by the use of such coloring matters as powdered talc and Prussian blue.

Tea Exports. The tea exported each year from the four chief tea-producing countries amounts to nearly 800,000,000 pounds. Japan and Formosa, which are the most important producers of green teas, send the bulk of their output to the United States. Formosa also produces large quantities of

oolong tea, a black tea with the flavor of green, which has been partly fermented. The United States and Canada buy a small amount of green tea from Ceylon, India, and Java, but these countries are producers of black tea almost ex-



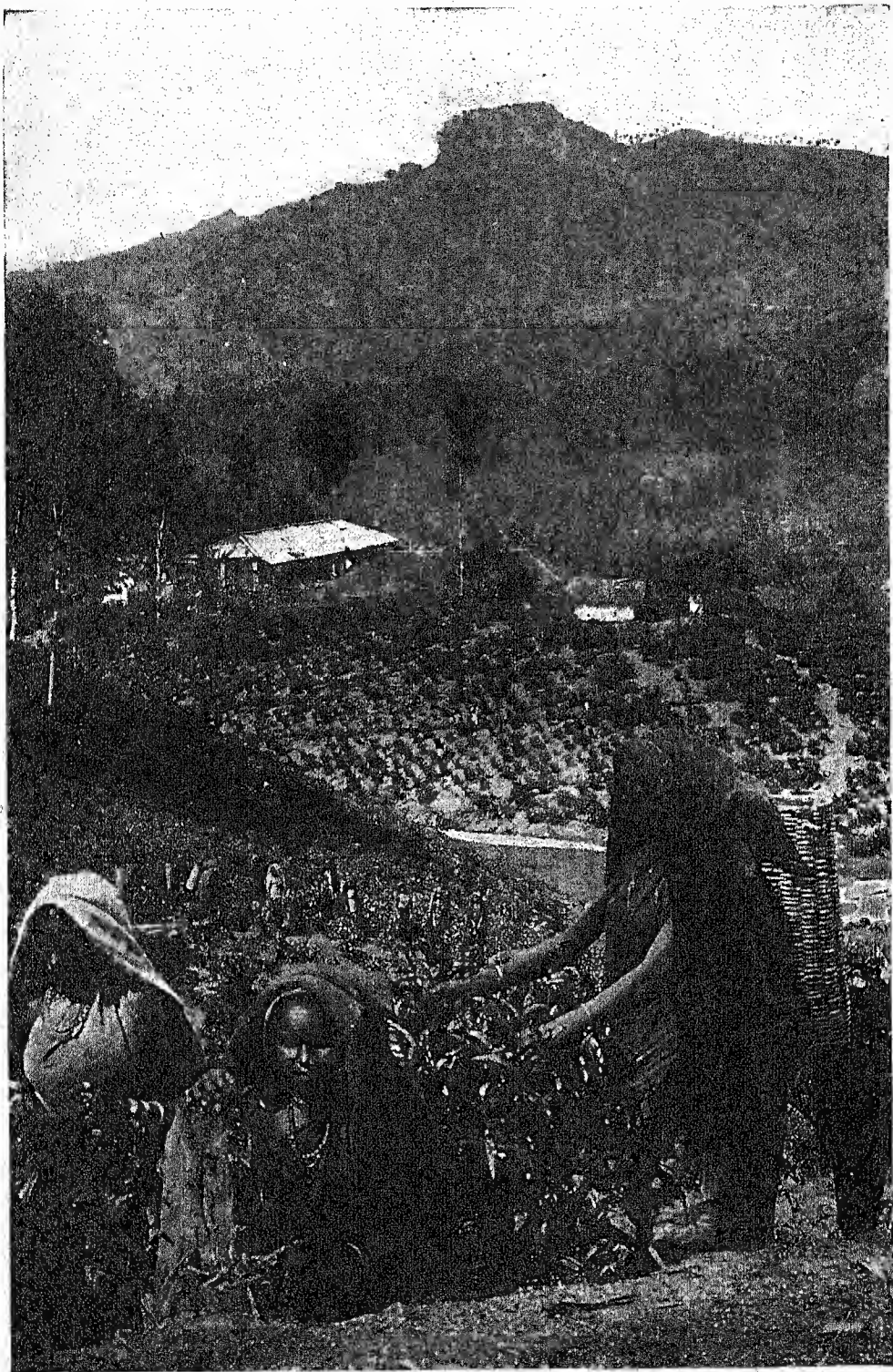
IN COLORFUL JAPAN

Above, a ceremonial tea. Below, serving tea under cherry trees heavy with blossoms.

clusively. Ceylon and British India supply the greater part of the English demand for black tea. China, which has a large American trade, produces both green and black varieties.

The Story of Tea. The Orient has a legend to account for the origin of tea. There was a saint in India, so the story goes, who prayed without ceasing for many years, and then one day fell asleep. On awakening, he was so grieved to think that he had let his weakness overcome him that he cut off his eyelids and threw

them on the ground. For five years more, he was able to continue his meditations, when he again felt sleep coming upon him. However, he chanced to chew some leaves from a convenient shrub, and received stimulation



In Ceylon. Native girls picking tea on one of the largest plantations in the island.

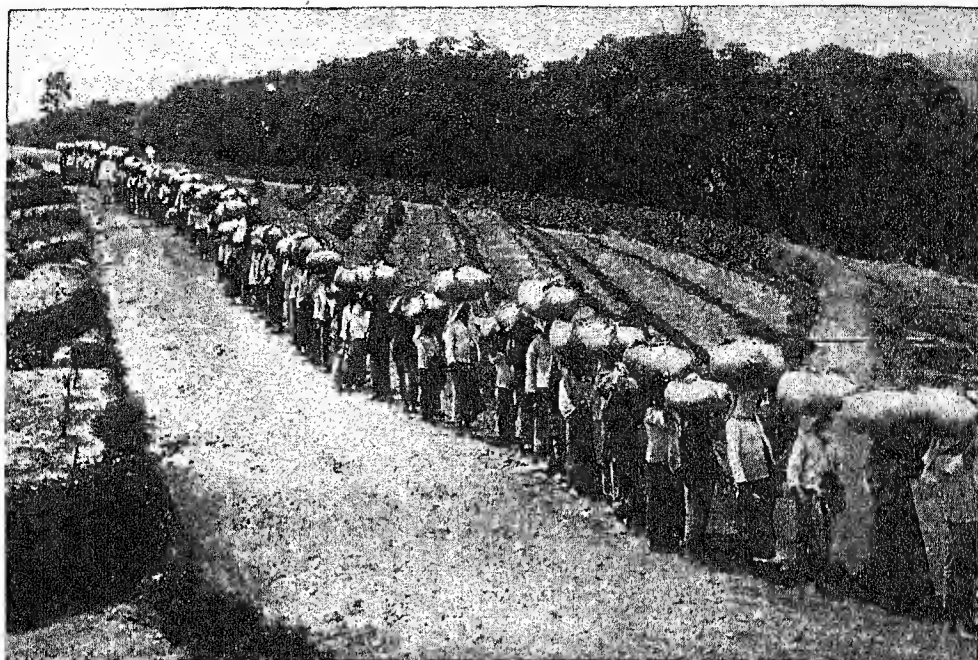


Photo: Visual Education Service

AT THE END OF THE DAY

Native pickers in Java starting from the fields to the sorting sheds. Some of the tea bushes in the illustration have been trimmed to promote new growth, while others remain in full leafage.

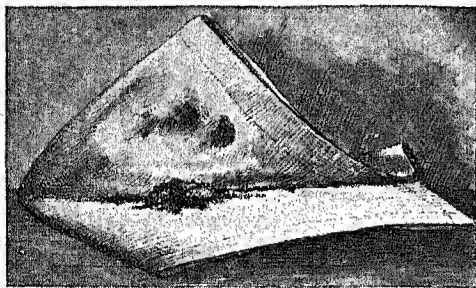
which drove off his drowsiness. The world still uses tea to keep it awake. It is known that tea was used as a beverage in China as

diary of Samuel Pepys, one may read this entry, dated September 25, 1666:

I did send for a cup of tea, a China drink, of which I had never drunk before.

This novel drink grew so steadily in favor that, by the close of the eighteenth century, it was being consumed by the English at the rate of two pounds a year per person.

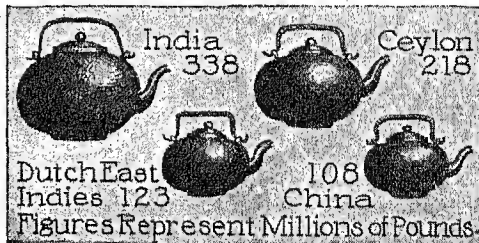
The tea industry began in British India about 1834 under the auspices of the East India Company, whose monopoly on tea



TESTING TEA FOR PURITY

One of the most common adulterations of tea is the dyeing of the leaves to give them a good color. The fraud is not hard to detect. Place dry tea leaves between the folds of a clean, white cloth, and rub the folds together. If the tea is pure and has not been treated, no marks will appear on the cloth; dye stains will soil the cloth and be difficult to remove.

early as the sixth century, and was extensively cultivated in Japan in the ninth, but its virtues were unknown to Europeans until the seventeenth century, when it was introduced into Europe by Dutch adventurers who had learned about it from the Chinese. In the interesting



ANNUAL PRODUCTION CHART

The principal countries from which the world gets its tea.

was abolished the same year, but the Dutch preceded the English in this field, for experiments in tea culture were made in Java as early as 1826. The industry was put on a

paying basis in Formosa about 1860, and in Ceylon in 1876. An enthusiast on the subject has paraphrased the Bible, thus:

Tea is better than wine, for it leadeth not into intoxication; it is better than water, for it doth not carry disease.

A Booklet on Tea

Use three sheets of paper 9x12 inches, or larger, and fold once, making twelve pages.

Cover page—*Story of Tea* in center; at bottom, name of pupil, grade, and school.

Illustration: Border of conventionalized blossoms.

Inside cover—Blank.

Pages one and two—Original story, *My Visit to a Japanese Tea Field*. Describe general appearance of field and tea-pickers.

Illustration: Sketch of field (see halftones herewith).

Page three—Description of tea plant.

Illustration: "Close-up" view of a single shrub.

Page four—Essay, *The Good Things About Tea*.

Illustrations: Teapots and teacups of various designs.

Page five—Essay, *The Evils of Tea*.

Page six—The Oriental story of the origin of tea, told in the pupil's own words.

Illustration: Man in Chinese or Japanese garb.

Page seven—Essay, *Preparing Tea for Market*.

Illustration: Trays on which leaves are dried.

Page eight—Where tea comes from.

Illustration: Diagram or map showing countries that lead in production.

Inside back cover—Blank.

Back cover—Quotations on tea.

TEACHERAGE. See NORTH DAKOTA (Education).

TEACHERS, AMERICAN FEDERATION OF. The American Federation of Teachers is a national professional organization of classroom teachers affiliated with the American Federation of Labor. It was organized in 1916. A few teachers of social vision, who were thinking in terms of community interest and social progress, brought this organization into life, as a protest against what were claimed to be abuses of power that had grown up in school administration, and as a means for combating influences which seemed to be attempting domination of the schools.

The purposes of the organization are to bring associations of teachers into relations of mutual assistance and coöperation; to obtain for them all the rights to which they are entitled; to raise the standard of the teaching

profession, by securing the conditions essential to the best professional service; to promote such democratization of the schools as will enable them better to equip their pupils to take their places in the industrial, social, and political life of the community.

The chief aim of this group is to democratize the schools; to put into practice Professor Dewey's ideals of democracy in education. The slogan adopted is "Democracy in Education; Education for Democracy."

To accomplish this ideal, and to build a true profession, the fundamental needs seem to be the establishment of teacher tenure during efficiency, and the release of the teacher's voice in school administration. Since the adoption of this program, teacher-tenure laws have been enacted in twelve states, and others are considering them. Teachers' councils, controlled by the teachers and participating in the determination of educational policy, have been established in a few cities, on the American Federation of Teachers' principle that teachers should not be mere followers, but should be sharers in the making of educational and school-administration policies.

The sabbatical leave, with adequate compensation, has become operative in some cities, and has been accepted by them as a sound policy. Payment for absence due to illness, quarantine, or death in the immediate family, is another policy strongly advocated by the American Federation of Teachers.

Other measures which the Federation favors are: A pension after twenty-five or thirty years of service; a maximum of 1,500 pupils to a building and a maximum of thirty pupils to a class; elective boards of education, possessing financial independence and having teacher and labor representation; academic freedom for teachers and pupils, especially in the social and natural sciences; the right of married women teachers to employment; the single-salary schedule for those having equal qualifications; a cultural wage with annual automatic increments and a two-thousand-dollar minimum. F.C.Ha.

TEACHERS' COLLEGES. See SCHOOL (Special Schools).

TEACHING, MOTIVATION OF. The motivation of teaching consists in planning and teaching the work of the schools so that the tasks of the pupil are made significant and purposeful to each child, by relating them as closely as possible to his childish experiences, questions, problems, desires, and needs. The child's work is motivated whenever he sees a real use in it—whenever it satisfies some need he feels, provides some value he wants, supplies some control he wishes to possess, secures some desired end, or helps him to attain any definite goal.

A Definite Purpose in View. The goal sought may be near or remote—as near as

winning the prize in a spelling contest; as remote as gaining the ability and skill to construct a box kite. So long as a child comprehends, more or less clearly, the relationship between the work he is doing and the end sought, his work is motivated. The more definitely he appreciates this relationship, and the more keenly he desires to reach the given goal, the more impelling are his motives.

It has long been held that, if the school would be successful in its work, the teacher must be guided constantly, in every detail of her work, by a sensible, clear-cut, definite purpose. In recent years, it has come to be perfectly evident that, if the pupils' work is adequately motivated, they, too, must be working always under the guidance and inspiration of a definite, attainable purpose or goal. In other words, the activities and work of the school should be so planned by the teacher that questions of vital importance to the pupils are naturally asked by them, as the work progresses. These questions reveal the problems confronting the pupils and the needs they feel. The next work of the school should then be so planned that the pupils find their needs supplied, their questions answered, and their problems solved.

An Illustration. Under their teacher's leadership, the pupils of a school decided to remember the birthday of an elderly, poverty-stricken woman who lived all alone near the school. They not only wished to send her some flowers and a more enduring present, but, likewise, they planned to go to her home at the dinner hour on her birthday, taking with them food for a substantial dinner, and spending the early portion of the evening with her. The dinner was to be followed by an appropriate little program of entertainment, consisting mainly of a talk by one of the pupils presenting the gift, and of singing songs which they thought she would enjoy.

For a number of days, the execution of this plan afforded the children very profitable work. In the arithmetic class, they estimated how much each child should earn, in order that they might have enough money with which to buy the present and flowers, and meet the expenses of the dinner. In the composition class, they developed the talk which was to be made by the pupil presenting the gifts. In the music classes, they selected and practiced the songs which they sang on the evening of the birthday party. Under the inspiration of carrying through successfully what they had decided to do, their school tasks which enabled them to accomplish their end were interesting and attractive. They worked not only with enthusiasm, but with accuracy.

Interests and Tendencies. Any teacher who wishes to motivate the work of her pupils needs, in the first place, to be so familiar with

the interests and tendencies which are natural to children that she is able to think in terms of their attitudes and wishes, in planning her work. School work which is built upon one or more of the following tendencies or interests, which are normal to children, is rather certain to be well motivated.

(1) *Earning Money and Acquiring Property.* Though this tendency in children needs to be used guardedly as the basis for school work, yet every experienced teacher knows that, almost irrespective of a child's age or condition, difficult tasks become attractive if one result of his work is having some money or property of his own. As employed in school, this tendency is less dangerous if the commercial gain sought goes to a group or class, rather than to a single pupil. Writing or other contests, in which pupils have an opportunity to participate for commercial gain, are many, and excellent results to the children follow from participating in these contests, but due care should be exercised to avoid the objectionable results which follow from too great use of prizes of value in stimulating effort in school work.

(2) *Competing for Results, a Reward, or an Honor.* A pupil who is striving to attain any one of these ends through school work has a strong motive for effort. The instincts of ownership, ambition, emulation, rivalry, love of approbation, and courage are all appealed to. The efforts put forth by pupils in spelling, oratorical, music, and debating contests are largely the result of the native tendency in children to compete for results.

(3) *Playing Games.* Play is the dominant activity in childhood. Any work which may be done, or any result which may be accomplished through play or through taking part in a game, is strongly motivated. Any child willingly prepares and practices that he may do his part well in a game. He sees that his only right to take part with a group engaged in a game is ability to aid in winning the game. Modern education makes large use of the interest of children in such games as the relay race in spelling and numbers; bean bag in language, spelling, and numbers; mail carrier and Santa Claus in beginning reading; baseball in spelling and numbers; and so on. Games in great variety are employed in language work, in teaching polite usage and the correct use of idiomatic language. One reason why dramatization, which is so much used in reading and language work, secures such good results, is that the game and play elements are involved.

(4) *Making Things.* The constructive instinct is strong in children of all ages. They like to manipulate materials, and see what they can produce as a result. The small child works with its blocks to see what it can produce, while the child a little older may take paper and scissors, or a piece of wood and a jack-

knife. All of the constructive and manual-training work in the schools is largely based upon this interest of children. It results in the children making simple birthday or Christmas or Valentine gifts, for parents or other relatives. Often the children of an entire room or class unite to produce articles needed about the schoolroom or in the corridors of the building, such as a bookcase, a rug, a couch cover, curtains, or a pedestal for a piece of statuary.

(5) *Entertaining.* Children enjoy entertaining. They like to have the pupils of another room visit them, or to have their parents or other mature people come as their guests. The instincts of imitation, play, sociability, expression, ambition, rivalry, love of approbation, pride, and so on, find expression in entertaining. The wise teacher, recognizing this tendency in children, makes it the basis for securing good work in all of the subjects which are drawn upon when a program is developed to provide entertainment for the guests. Such programs will usually require music, story-telling, calisthenics, reading, and dramatization. The motive of entertaining well through these means supplies the impelling power which is necessary to good work in these subjects.

(6) *Sharing.* The activity of sharing is very similar to that of entertaining, and is based upon the same instinctive tendency. Just as the adult wishes to share with his friends the results of his labors, be they fragrant roses, a model dairy, or an exquisite painting, so children wish to share the products of their labors. Hard work becomes a delight when there is a prospect ahead of sharing with others the results of their efforts.

Good schools plan to give the children large opportunities for sharing with each other. Any interesting experience enjoyed by a group of children is shared with others who might enjoy it and profit by it. They might write it up and send it to different rooms, or send children to talk about it in the different rooms. The school assembly, in which the entire school meets, is an excellent plan for sharing with all the best that any room produces.

(7) *Advancing Self in the Estimation of Others.* Children, as well as older people, are anxious to be highly esteemed by others. What person is not happy in a task, regardless of its difficulty, if he sees that it will enable him to rise worthily in the esteem of others for whose good opinion he cares? Pupils strive hard for good grades, that the teacher may think well of them, that they may merit the esteem of their classmates, and that they may please their parents and others who care about their progress.

(8) *Promoting Self-Development.* This motive appeals more strongly with advancing years. It leads the student to undertake tasks involving long periods of effort, sometimes months

or even years. It impels the student of science to undertake difficult and extended investigations, to assume great risks, and to endure great privation. Success is assured when this motive becomes dominant.

Under the influence of this motive, students are found not only meeting the requirements of the teacher in the preparation of lessons, but visiting scientific and historical collections, and going to other sources of help outside of the school, such as to the city, college, or state library. Such students also insist upon solving their difficult problems and performing their science experiments unaided.

(9) *Preserving Products and Collections.* This motive has a strong basis in the instincts of collecting, ownership, preservation. Children collect and preserve beautiful stones, postage stamps, pictures, post cards, playthings, and so on. Older persons preserve letters, gifts, heirlooms, or scientific collections. This motive may be invoked in getting pupils to keep well-organized outlines and complete notebooks.

(10) *Mastering and Conquering.* The instinct to subordinate and control both matter and persons is one of the most imperious of man's tendencies. It asserts itself in infancy in the child's desire to know, to understand, and to rule or to lead in his group. It grows in strength with succeeding successes, and is checked only when ambition is crushed. The presence of this tendency in children is the school's greatest hope of getting the pupils to do their work. The school should train children to solve problems and to meet difficulties unflinchingly.

(11) *Fitting for a Life Career.* While not functional in early childhood, the goal of preparing for a successful life career becomes a strong motive quite early, with ambitious children. Under the stimulus of this motive, programs of work and hard tasks, extending over a series of years, are undertaken with enthusiasm and determination. An appeal to the child's desire for future success is seldom devoid of results, and is most often met with a hearty response and a renewed will to work. H.B.W.

TEAK, *teak*, a beautiful forest tree of the verbenaceae family, native to Southeastern Asia. It is the source of a wood highly valued for shipbuilding and for furniture-making. The special qualities of teakwood are strength, durability, and resistance to water; in addition, it is easily worked, takes a high polish, and contains a resinous oil that makes it resistant to insects. In appearance, the wood resembles coarse mahogany. Teak trees sometimes grow to be 200 feet in height, and are generally found in groups in forests of other trees. The leaves, which are often two feet long and a foot and a half in width, yield a purple dye, and are also utilized for thatch and wrapping material. In British India and Burma, the cutting of teak and the transportation of the

logs to the sawmills constitute a flourishing industry that is under government control. Elephant labor is used to get the logs out of the jungles.

A tree known as *African teak*, or *African oak*, belonging to the spurge family, is also valued for its wood, which is used for about the same purposes as the Asiatic teak-wood. The African wood, however, is the less durable. G.M.S.

Scientific Names. The Indian teak belongs to the family *Verbenaceae*. Its botanical name is *Tectona grandis*. The African teak is *Oldfieldia africana*, of the family *Euphorbiaceae*.

TEAL, teal. See DUCK.

TEAM WORK. See CHARACTER TRAINING, sub-head.

TEAPOT DOME. See HARDING, WARREN GAMALIEL (As President); COOLIDGE, CALVIN (Teapot Dome Investigation).

TEAR GAS. See POISON GAS.

TEASDALE, SARA (1884-1933), an American poet who won the keen

admiration of discriminating readers, because of the rhythm and purity of form of her lyric verse. She was born in Saint Louis, Mo., and educated there in private schools. Miss Teasdale traveled extensively. The fine quality of her work was maintained steadily after her first volume appeared, in 1907. In 1914 she was married to Ernst B. Filsinger, of Saint Louis, but in 1929 they were divorced.

Her Writings. These include *Sonnets to Duse*, *Helen of Troy and Other Poems*, *Rivers to the Sea*, *Love Songs*, *Flame and Shadow*, and *Dark of the Moon*. She also edited *The Answering Voice—One Hundred Love Lyrics by Women*, and *Rainbow Gold, Poems Old and New Selected for Boys and Girls*.

TEASEL, te' z'l, the common name of a genus of plants containing one commercially

valuable species, the *fuller's*, or *clothier's*, teasel. This plant, which is native to the south of Europe and has been naturalized in America, is used to raise the nap on cloth. The parts employed for this purpose are the heads of the tubular pale-lilac or white flowers. These

heads are cut in two and attached to a cylinder which is made to revolve against the cloth. The largest heads are used for raising the nap on blankets; the next size, for raising that on cloth for men's garments. Small, immature ones are used for fine woollens and broadcloth. Strange to say, no mechanical device has ever been invented which satisfactorily fills the place of this plant. It is a thistle-like herb, with long, stemless leaves, prickly stems, and stiff, sharp bracts surrounding the flower heads. B.M.D.

Scientific Name. The species described is *Dipsacus fullonum*, family *Dipsacaceae*.

TECHNICAL AND INDUSTRIAL EDUCATION. The modern trend toward

the practical in education is seen in the establishment of vocational courses in the public schools and in the successful operation of numerous institutions which prepare young people to earn their livelihood. Technical and industrial education is a general term covering the various forms of instruction having this end in view. Such instruction is carried on in technical high schools, in manual-training classes, and in trade schools, and is continued in schools of applied science and technology of college rank. Among immature students, mistakes are often made, because these inexperienced young people do not always know for what vocations they are best fitted. What is being done to direct such students, and to help them choose vocations in which they will be successful, is



Photo: Visual Education Service

TEAK TREES

In the Federated Malay States.

told under the headings of MANUAL TRAINING, VOCATIONAL EDUCATION, and VOCATIONAL GUIDANCE.

TECHNOCRACY, *tek nok'ra se*, a term referring to a group of engineers, scientists, and technologists and to their theory that machines have brought about such overproduction that new ways must be found to rationalize industry. The theory was largely based upon an energy survey of North America which indicated that increases in the mechanization of industry had taken place so rapidly that the mechanical energy then available was sufficient to replace a good portion of the workers. From this it was argued that a breakdown of the prevailing price system was near. At the beginning of 1933, technocrats reported that a series of surveys had been made through a period of twelve years which showed many developments of the "power revolution." For example, it was shown that the man-hours required to build an automobile had, since 1904, been shortened from 1,300 to ninety hours. Technocrats asserted that the total man-hours in manufacture were decreasing steadily with time, while the production per capita was increasing directly with time. They urged industrial planning for the future, based upon the results of these studies and surveys.

The term "technocracy" now designates the ideology of that group concerned more with the popular than the scientific aspects of the theory.

TECUMSEH, *te kum' seh* (about 1775-1813), an American Indian chief, of Shawnee and Creek stock, was born near the site of the present city of Springfield, O. When about thirty-five years of age, he, with his brother Tenskawatawa, known as "the Prophet," formed a great union or confederacy of Indian tribes, and about 1810 Tecumseh made a long trip through the present Southern states, to persuade the Creeks, Seminoles, and other tribes to join in the plan. He was a powerful orator, and his speeches during this journey are believed to have caused the Creek War of 1813.

While he was absent, his own tribe was badly defeated by General William Henry Harrison, in November, 1811, at the Battle of Tippecanoe, in Indiana; during the next year, the chief was appointed brigadier general in the British army, and he rendered valuable service against the Americans in the War of 1812. He was killed in the Battle of the Thames River, in Ontario, Canada. Tecumseh was a believer in the primitive virtues of the red man; he prohibited the use of intoxicants among his tribe, and did much to lead his followers back to the simple ways of their forefathers.

Related Subjects. The reader may consult in these volumes, for explanation of references and for further information, the following articles:

Harrison, William Henry
Indians, American (Shawnee)

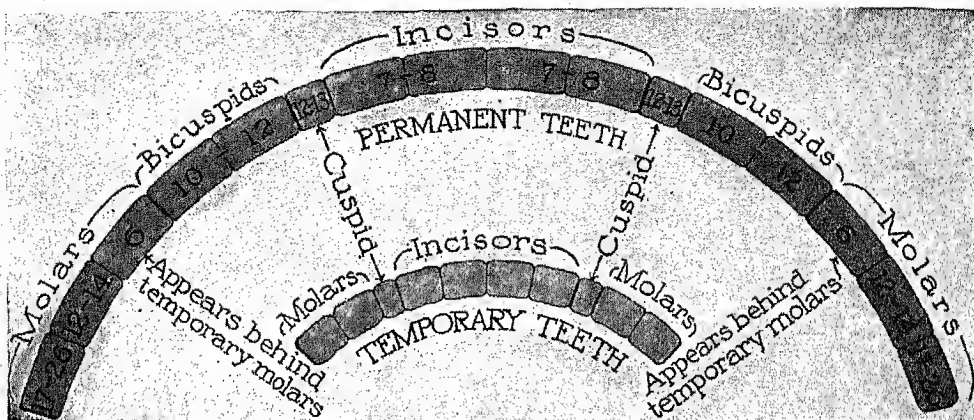
War of 1812 (Battles
of the War)

TE DEUM, *te de' um*, a famous Latin hymn, so called from the opening words, *Te Deum Laudamus* ("We praise Thee, O Lord"). Though one of the most solemn and majestic church songs ever written, it is also one of the simplest, and its words have inspired many composers to set them to appropriate music. The *Te Deum* is sung in Roman Catholic churches on occasions of rejoicing and thanksgiving, and it is found in the *Breviary* (which see) and in the Anglican prayer book, wherein it follows the first Lesson of Morning Prayer, unless the *Benedicite* is used in place of it. The authorship is unknown, but is ascribed by tradition to Saint Augustine and Saint Ambrose; now, more generally, to Nicetas, bishop of Remesiana, in Dacia.

TEETH. Like the hair and nails, the teeth are an outgrowth of the skin, the growth in this case taking the form of hard, shiny projections specially adapted for the work of cutting and tearing food, and of grinding it to a pulp. The tusks of the male elephant are really out-turned eyeteeth, the largest teeth possessed by any animal. The anteater (which see) has no teeth, but most vertebrates possess them. Man and most of the higher animals have two sets of teeth, a temporary and a permanent set. In the case of human beings, the first, or *milk*, set usually develops between the sixth and thirtieth months; and when the child is two and one half years old, it has twenty teeth. At the age of five, the first of the permanent set begin to appear, but the last of these sometimes do not break through until the twenty-fifth year.

Names and Structure. There are thirty-two teeth in the permanent set of an adult, eight in each half of each jaw. In each half there are two incisors, one *canine* (called the *eye-tooth* in the upper jaw, because it is just below the center of the eye), two *bicuspid*s, and three *molars*. Because the last of the molars develop between the seventeenth and twenty-fifth years, they are called the *wisdom* teeth. The bicuspid's take the place of the temporary molars, but all of the permanent molars, twelve in number, are entirely new teeth.

Each tooth has three parts—the *crown*, that part seen in the mouth; the *root*, the part embedded in the jawbone; and the *neck*, or *cervix*, a narrowed portion between the crown and root. The jaw is furnished with sockets called *alveoli*, into which the teeth fit. The various kinds of teeth differ considerably in regard to the shape of the crown. That of an incisor is shaped something like a chisel, with sharp, horizontal cutting edges, for the incisors are used to bite or gnaw off the food. The canines (*dogteeth*) have thicker crowns, shaped somewhat like a cone, with a central point on



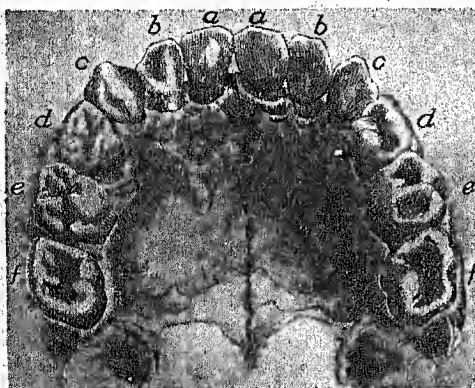
AVERAGE TIME OF APPEARANCE OF TEETH

The figures represent the age of the individual. [From a bulletin of the United States Bureau of Education.]

the cutting edge. In the case of dogs and cats, the canines are very long and pointed, for with them these creatures grasp and hold their prey. The bicuspid are not so long as the canines, and are somewhat cube-shaped. Each has an

is fixed in place by a thin layer of bone known as *cementum*, and at its tip is a narrow aperture, through which the blood vessels and nerves of the pulp cavity enter. Exposure to the air of these delicate nerves, through decay of the outer parts of the tooth, is responsible for the agonies of toothache.

Care of the Teeth. Because the inside of the mouth is always moist and warm, it is a very favorable breeding place for germs of all kinds. A neglected mouth may harbor organisms that cause diphtheria, pneumonia, and other infectious diseases. Furthermore, accumulations of food particles, collecting in the spaces between the teeth, at the margin of the gums and elsewhere, encourage the multiplication of countless bacteria, which form acids on exposed sur-

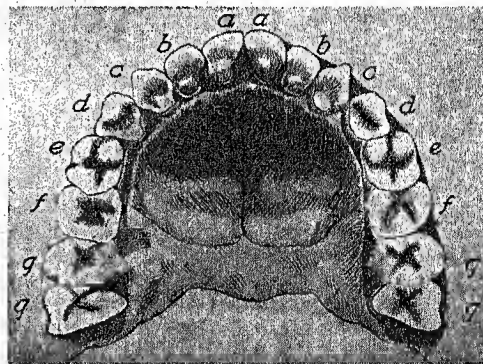


FIRST SET OF TEETH

(a) Central incisors; (b) lateral incisors; (c) cuspids; (d, e) temporary molars; (f) sixth-year molars.

inner and an outer point, or *cusp*, on the cutting edge. Hence the name, which means *two-cusped*. The molars, or grinders (*mill teeth*), are provided with large crowns, roughened in such a way as to adapt them to crushing and grinding the food. The molars of the upper jaw have three roots; those in the lower, two.

During the life of a tooth, a soft pulp, containing nerves and blood vessels, fills a cavity known as the *root canal*, which extends through crown and root. Immediately surrounding the cavity, and making up the greater part of the bulk of the tooth, is a hard, bony, yet elastic, substance called *dentine*. This is covered on the crown with *enamel*, a tissue so hard that it will strike fire with flint. The root of the tooth

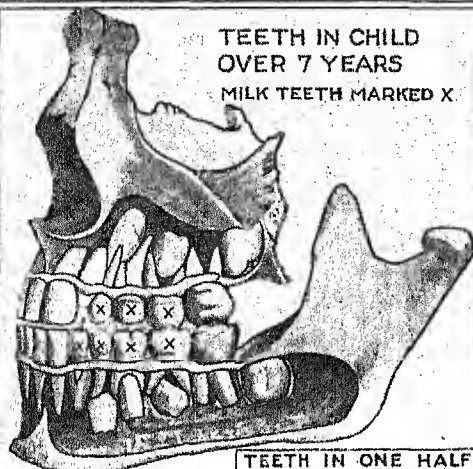


PERMANENT SET OF TEETH

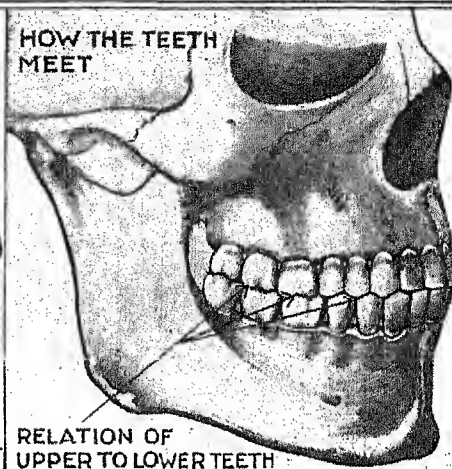
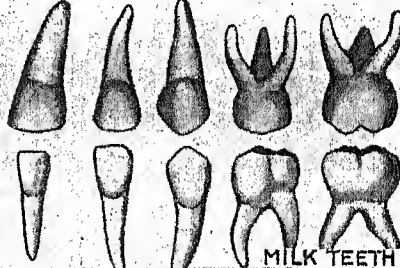
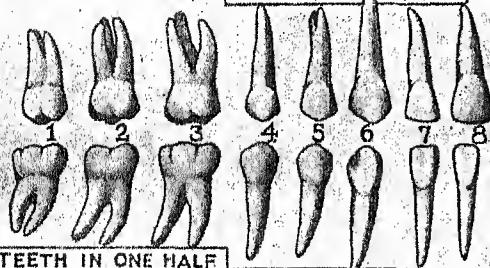
(a) Central incisors; (b) lateral incisors; (c) cuspids; (d, e) bicuspid; (f) sixth-year molars; (g) molars.

faces of the teeth. These acids eat into the protecting enamel, and if no steps are taken to prevent further harm, ultimately cause the teeth to decay. For these reasons, the mouth and teeth should be scrupulously cared for,

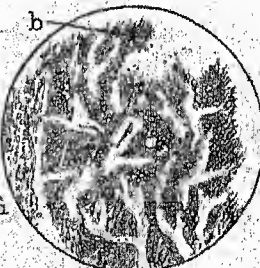
TEETH and THEIR GROWTH



HOW THE TEETH MEET

TEETH IN ONE HALF
OF UPPER JAWTEETH IN ONE HALF
OF LOWER JAW

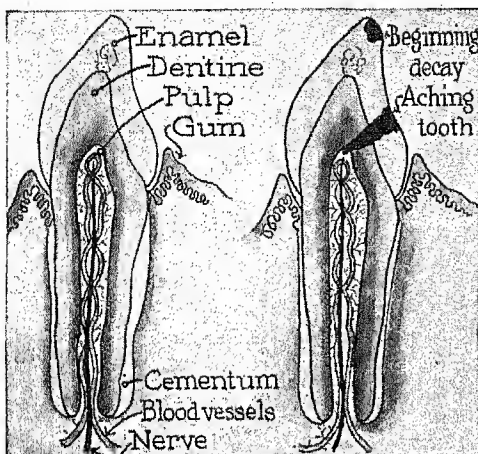
- 1-3rd MOLAR 5-1st PREMOLAR
2-2nd MOLAR 6-CANINE
3-1st MOLAR 7-LATERAL INCISOR
4-2nd PREMOLAR 8-CENTRAL INCISOR

PERMANENT
TEETH OF
LOWER JAWCHRONIC
ABSCESS AT
ROOT OF
LOWER
INCISORLOWER
LIP

TOOTH



from infancy to the end of life. Parents who think the temporary teeth need no attention are badly in error. The first teeth of the small infant should be cleaned, at least twice a day, with a soft brush, and just as soon as the child is old enough to handle a brush, he should be



AN INCISOR

Diagram, at left, shows the principal structural parts. At right, the beginning of decay and the point at which pain is ultimately felt; the latter occurs when the process of decay has reached the pulp.

taught to perform this hygienic act for himself. Neglected teeth in the mouth of a little child are a source of physical pain and a detriment to thorough chewing and to the general health, and they have an adverse effect on the teeth which come later.

Not only should the teeth be thoroughly scrubbed, but the gums and back of the tongue also need daily cleansing. In addition to a good, moderately stiff brush, one should have in the toilet equipment a reliable tooth paste or powder, and an antiseptic mouth wash. Advice on these matters is always cheerfully furnished by the family dentist, who should be visited at least twice a year by each member of the family. The custom of brushing the teeth sidewise has fallen into disfavor, as this method lacks thoroughness. Instead, the brush should be placed upon the gum and manipulated with a rotary movement, upward on the lower teeth and downward on the upper. The teeth should be cleaned on the inside and out, and back to the last molars, and the mouth rinsed by forcing water between the teeth. If possible, a brushing should be given after each meal, but under no circumstances should one omit it at night, before retiring. If such precautions are taken, and the teeth are cleaned and examined twice a year by a reliable dentist, decay of these important organs can usually be prevented, or at least materially checked.

Aside from neglect of the mouth, unhygienic habits of eating may affect the teeth. The custom of bolting the food, or of including too great a proportion of soft and partly digested foods in the diet, interferes with that vigorous exercise of chewing so essential to the health of the teeth. The diet should be one that requires considerable mastication, and it may well include such acid fruits as apples, oranges, and grapefruit, all of which tend to keep the teeth clean. Another deplorable habit is that of breathing through the mouth, which causes dry, unhealthy gums. This is often due to enlarged tonsils or adenoids, and mothers and teachers everywhere should be on the watch to detect these conditions. It should be borne in mind that bad teeth are often a cause of disease elsewhere in the body, for cavities due to decay are a possible source of infection.

Preventive dentistry also emphasizes the importance of a tooth-building diet for the mother, before the birth of her child. The child whose mother has eaten proper amounts of milk, leafy vegetables, fresh fruit, butter, eggs, and whole-grain cereals is quite likely to have strong teeth. K.A.E.

Related Subjects. The following articles in these volumes may be consulted in connection with the study of the teeth:

Adenoids	Life Extension
Dentistry	Mastication
Digestion	Mouth
Education (Hygiene)	Pyorrhoëa

TEGNER, *teg' nair*, ESAIAS (1782-1846), a Swedish poet, born at Kyrkerud. He was educated at the University of Lund, Sweden, where he served first as a tutor and lecturer, and later as professor in Greek, until his appointment as bishop of Vexjö, in 1824. His first success as a poet came in 1808 with the writing of a stirring war song. Three years later, he was crowned by the Swedish Academy for his patriotic ode *Svea*. During this same year, he founded the Gothic League of Sweden, for the study of old Scandinavian history and literature, and to its magazine he contributed some of the best of his critical discussions and verses.

In 1817 he wrote his famous *Song to the Sun*, and the outside world began to discuss him. Later appeared his three masterpieces: the romance *Axel*; the delicate idyll, or pen picture, entitled *The First Communion*, translated in later years by Longfellow; and the poem which Goethe called "the old, mighty, gigantic, barbaric epic," *The Story of Frithjof*, based upon ancient legends of Northern Europe, and by far the best-known of all Swedish writings. During the next fifteen years, Tegner's mind became unsettled by an unhappy love affair, and he did no more work of importance.

TEGUCIGALPA, *tay goo se gal' pah*, capital of Honduras (which see).

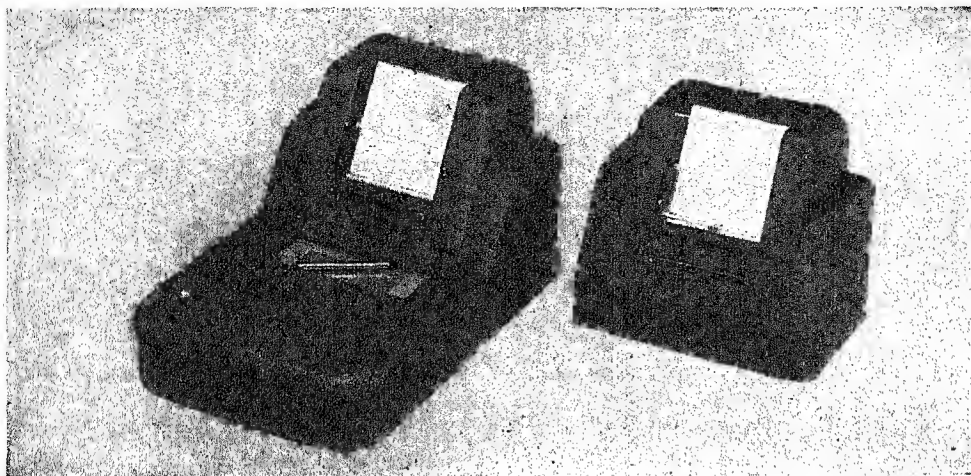


Photo: Telautograph Corp.

TELAUTOGRAPH SENDING AND RECEIVING APPARATUS

TEHACHAPI MOUNTAINS, a range in southern California, which the Indians named for the oak trees on the mountainsides.

TEHOKHONDO, MOUNT. See STANOVOL MOUNTAINS.

TEHRAN, *teh rah'n'*. See PERSIA.

TEHUANTEPEC, *tay wahn tay pek'*, ISTHMUS or, the narrowest portion of Mexico, comprising that part of the country lying between the Gulf of Campeche, an arm of the Gulf of Mexico, and the Gulf of Tehuantepec, a part of the Pacific. It includes the southeastern parts of the states of Veracruz and Oaxaca, and small districts of Chiapas and Tabasco. The isthmus is 130 miles from north to south at its narrowest point; its mountains are broad and low, and for five hundred years it has been suggested as an interoceanic route for a railway or canal. In 1907 a railroad 192 miles long was completed; it extends from Puerto Mexico, on the Gulf of Campeche to Salina Cruz, on the Pacific. There is a branch from Juile to San Juan Evangelista, eighteen miles in length, and connections may be made with the Veracruz & Pacific Railway, from Santa Lucrecia. Four days may be saved in routing a cargo from New York or London over the Tehuantepec Railway, instead of through the Panama Canal, and electric machinery is provided at the docks for loading and unloading. R.H.W.

TEJU, *teh yoo'*, the common name of a family of large, powerful lizards, found in South and Central America, the West Indies, Mexico, and the southwestern United States. There are over a hundred species, the largest being three feet long, including the tail. This teju is bluish-black above, with crosswise yellow stripes, and reddish-yellow below. The tejus live in burrows, and feed on small animals. They are very swift and agile. The species

described above is *Tupinambis teguexin*.

TELAUTOGRAPH, *tel aw' loh graf*, a telescriber, which is an instrument for transmitting writing, sketches, and figures by electricity, just as the telephone transmits voice. Writing is transmitted instantaneously and is reproduced in facsimile on one or any number of receiving telescribers within the building or at a distance. It was invented by Elisha Gray (which see).

The telescriber is about the size of an ordinary typewriter. It may be placed on a desk or table in any position convenient for writing. The message is written on a metal platen, with a stylus resembling an ordinary lead pencil. The stylus is associated with two transmitting potentiometers (instruments for measuring electromotive force) by means of light levers. The varying currents transmitted over line wires by motions of the stylus cause motion of similar levers to which is connected a writing pen. This pen reproduces the motions of the transmitting stylus, thus duplicating the writing. The pen is self-inking, fed from a large ink reservoir. As each message is completed the paper automatically spaces, permits the removal of the message from the machine, and provides a fresh surface for the next message.

The telescriber was first produced at the close of the last century by a company organized by Elisha Gray. As early as 1902 it was used in banks, hotels, and railroad terminals. Since then it has been adopted by organizations in almost every type of industry in the United States and Canada. Its success as a modern means of intercommunication is attributed to its instantaneous transmission of clear written messages to one or to as many points as desired simultaneously.

TEL AVIV. See PALESTINE (The Cities).



TELEGRAPH, *tel' e graf*, a device that ranks as one of the greatest civilizing agencies the world has ever known. It has revolutionized the means of communication. It has brought widely separated nations into the relationship of near neighbors, making them rapidly acquainted with the arts of peace, and as thoroughly serving them in the business of war. Combined with radio, it has increased man's avenues of communication beyond anything dreamed of a generation ago. The telegraph is a device for sending messages to a distant place by means of signals which represent words or ideas, as distinguished from the telephone, in which spoken words are reproduced at a distance. The word *telegraph* means *to write afar off*. The electromagnetic telegraph has displaced all other forms; hence the word is now understood to mean a device in which electricity is used in the transmission of signals to a distance.

The Speed of Telegraphy. "As quick as a wink" is a homely phrase for instant action, but only in the telephone and radio communication has human effort matched the telegraph for instantaneous effects. A telegraph operator presses his key in New York City; when his instrument clicks, in response to that pressure, a sounder at the other end of the line, for instance, in San Francisco, will in a small fraction of a second respond to the impulse that has traveled the breadth of a great continent. When Queen Victoria died, papers announcing her death were selling on the streets of American cities thirty minutes after the event, and before the slower English editors had printed the same information. The result of a horse race in Havana is known to thousands of sportsmen in all sections of America before the winning horse is led off the track. In early colonial days, a Bostonian wishing to get word to a man in New York might be able to journey back and forth in possibly twenty days. To-day, he can lift his telephone receiver, ask for the telegraph company, and then dictate his message to the waiting operator, who writes it immediately on a noiseless typewriter; or he can call a

messenger boy electrically, send a telegram, and, barring human delays, get an answer in about as many minutes, at a cost of a few cents. At daylight, on a morning in July, 1917, the English exploded a dozen mines at Messines, Northern Belgium, which they had planted under the Germans. Before daylight, across the western sea, papers containing the news were being delivered to their readers.

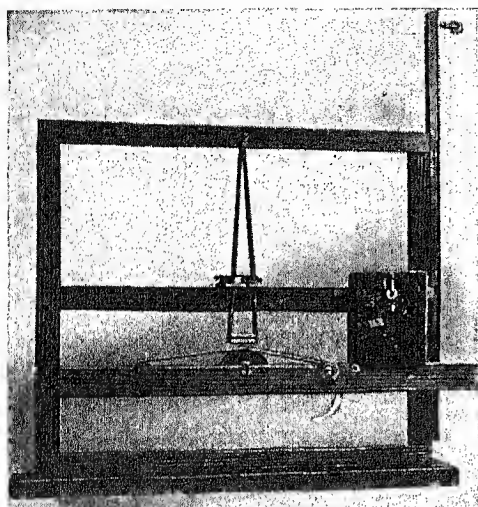
Such facts as these proclaim the marvel of the telegraph. Because of it, "a girdle can be put around the world" in a few minutes, and the news of feast or famine, coronation or death, in India, becomes a theme for congratulation or sympathy in an hour, in the Western world. A telegram has reached Sydney, Australia, from New York City, by direct wire, in three seconds—an electrical impulse pushed through twelve thousand miles of resisting wire, over mountains and under oceans, in about the time you need to walk a few feet.

Development. The first message over the telegraph wire, between Washington and Baltimore, in 1844, was "What hath God wrought!" The marvel of that crude first instrument, the invention of Samuel F. B. Morse, suggested powers almost supernatural, yet man has taken these physical forces, which even yet he understands only in part, and has employed them to carry his message to the uttermost parts of the earth.

To accomplish this, he has demanded almost 6,500,000 miles of wire for his telegraph and submarine cables—enough wire to stretch 260 times around the world. Of the land lines, the United States possesses about 2,020,000 miles of wire, or practically one-third of the lines of the world; Canada has over 305,900 miles. The total land-telegraph investment of the world, including wires, offices, and all equipment, is approximately a billion dollars, a great sum to be applied to an invention which was unknown within the memory of men yet living, and which is yet a novelty in many thickly settled countries.

When Samuel F. B. Morse invented the telegraph, it is doubtful if he realized the wide use to which his invention would ultimately

be put. Today, the transmission of telegrams is but one feature of the business of the world's largest telegraph company. In addition to handling messages, money is now sent telegraphically; photographs are sent over the



wires; facsimile messages, in one's own handwriting, are transmitted at a relatively cheap cost to the sender; the correct time is given hourly to thousands of persons by telegraph; and the nation's festive days are celebrated, in large part, by the widespread transmission of greeting telegrams, delivered on colorful blanks at no extra cost.

While the early telegraph was considered a marvel of speed, it cannot compare with the more modern equipment and instruments in use today. The manual method of telegraphy, by which dots and dashes were the medium of communication, has been replaced to a very large extent, by a more modern method of automatic telegraphy. In fact, more than three-quarters of all the telegrams handled in the United States today are sent and received automatically. The automatic method conduces to greater speed and accuracy, for one thing. Moreover, operators can be trained more rapidly and easily for this method of telegraphy.

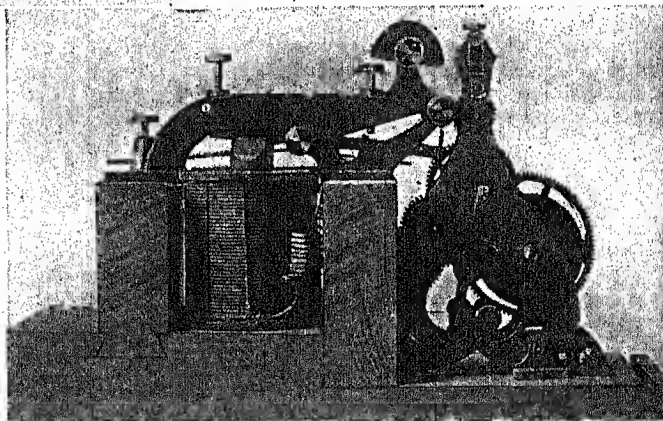
Printing Telegraph. The Teleprinter, or Teletype, automatic telegraph-printer and Multiplex automatic telegraph-printer are the machines principally used to handle most of the

nation's telegraphic business today. The Teleprinter resembles the conventional typewriter. The operator, to send a message, merely types it out on the keyboard.

On the ordinary typewriter, the keys and type bars are connected mechanically. On the Teleprinter, or Teletype, the connection is electrical rather than mechanical. Therefore, when an operator in New York, for example, presses the letter "E," the same letter is printed in a fraction of a second in Chicago. On the receiving end, the message comes out on a paper tape, which is then pasted on a telegraph blank. See illustration, page 7062.

The Multiplex printer operates in a somewhat similar manner, but with this machine the depression of the key by the operator causes perforations to be made in a strip of paper, which is then fed into an automatic transmitter, from which the signals are sent flashing over the wire. The use of automatic devices to handle telegrams marks one of the greatest advances in the history of telegraphy, and has put this business on a higher plane of efficiency than ever before.

Indeed, today, many steps in the handling



Photos: Western Union Telegraph Co.

THE FIRST MORSE RECORDERS

Above, the recorder built by the inventor of the electric telegraph in 1835. Below, an improved recorder, the one on which was received the first public message, "What hath God wrought!"

of a telegram are automatic. Not only is the telegram itself sent over automatic machines, but pneumatic tubes carry it from branch offices of the telegraph companies in large cities to the main operating quarters, and automatic belt-conveyors take the message to the proper sending operator and help to speed it on its way, to cite but a few of the automatic steps in use.

Probably one of the most important tasks performed by the telegraph company of today is the transmission of stock and commodity quotations. The stock quotations from the

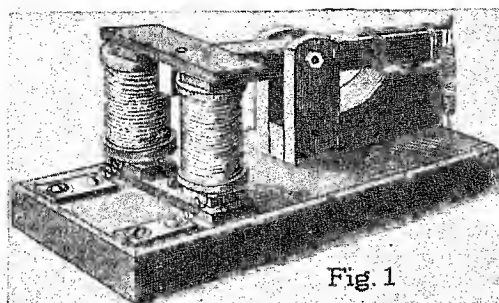


Fig. 1

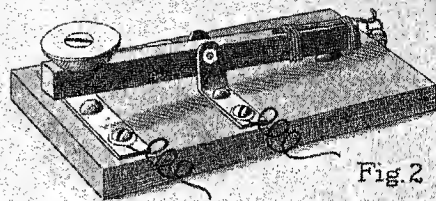


Fig. 2

A BOY CAN MAKE A SIMPLE SOUNDER AND KEY

financial center of New York are sent by the telegraph company to the four corners of the earth. When a broker on the floor of the New York Stock Exchange makes a sale, this sale and the price at which the stock is sold are recorded at the telegraph company's headquarters in New York City. Here it is retransmitted by an automatic machine to thousands of tickers in all sections of the country, so that to-day the investor in Oshkosh can keep in as active touch with the stock market as the broker in Wall Street. In like manner, the telegraph carries quotations on cotton to the entire world, from such cities as New Orleans and Galveston, and submarine cables bring to interested persons or firms in America quotations on copper, lead, silver, and other metals; land-line telegraphs also transmit

quotations on such a variety of commodities as livestock, resin, turpentine, butter, eggs, and poultry.

Newspaper Service. The telegraph is probably the newspapers' best friend, for it enables the large daily, as well as the small town weekly, to obtain the news of the world before this news has grown stale. Giant press associations, whose news-gathering facilities cover the earth, disseminate by telegraph the news they have gathered. You can pick up your morning paper in San Francisco and learn what has happened the day before in London, New York, Chicago, Philadelphia, Shanghai, Buenos Aires, or Paris. While you have been sleeping, the telegraph has been carrying the news of the world to thousands of papers.

Pictures by Wire. See TELEPHONE, subhead.

The Principle of the Telegraph

Telegraph and Doorbell Compared. An electric doorbell circuit is similar to a telegraph circuit. When a caller arrives at the door, he telegraphs the fact of his arrival by means of the electric bell. The bell corresponds to the telegraph sounder. The push button at the door corresponds to the telegraph key. If two wires are connected to an electric battery and to an electric bell, the bell rings, because the current from the battery flows through the coils of the electromagnet, which is part of the bell. If one of the wires is cut, and the ends are separated, the bell ceases to ring, because the circuit is open and the current cannot flow. If the ends of the cut wire are pressed together, the bell again rings.

Since it would be inconvenient to press the ends of two wires together every time one wished to ring the bell, a push button is used, the end of one wire being connected to a spring, and the end of the other to a second spring under the first. When the button is pressed, the two springs are pressed together, and this is the same as pressing the ends of the wires together. Pressing the button causes the bell to ring, because this closes the circuit and permits the current from the battery to flow through the bell. See ELECTRIC BELL.

In the telegraph, pressing the key closes the circuit and permits a current to flow through the electromagnet coils of the sounder. The electromagnet then pulls a piece of iron called an *armature*; it pulls only when a current is flowing through the coils of the magnet. When the key at the sending station is pressed down, it makes an electrical contact which closes the circuit and permits a current to flow through the electromagnet coils of the receiving instrument. The electromagnet then attracts the iron armature, pulling it down, and with it the brass arm of the sounder. This causes a click. When the key is released, the circuit is broken, the current ceases in the electromagnet, the sounder arm is released, and the spring pulls it up, causing a second click.

A Simple Telegraph. Two boys can easily set up a telegraph line between their homes. Two sounders, two keys, and one electric battery, which may consist of two or three dry cells, are needed. The magnet of an old electric bell can be used in making the sounder, or an electromagnet can be made, as follows:

With a hack saw or a file, cut off two pieces of soft-iron rod, each about an inch and a half long, and file the ends smooth. Cut out two round discs of hard fiber or stiff cardboard, and

DEVELOPMENT OF THE TELEGRAPH

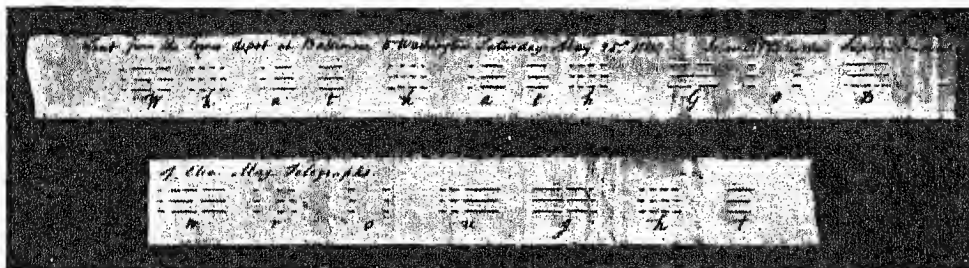


Photo: Hudson Historical

Above: A duplicate of the first public telegraph message, sent by Samuel Morse, the inventor, from Washington, D. C., to Alfred Vail, in Baltimore, Md., on May 24, 1844. The next day Vail, who had aided in the experiments at the Vail home near Morristown, N. J., repeated the message to Morse, and America's first telegraph line was in operation. Decoded, the dots and dashes of the historic message read: "What hath God wrought."

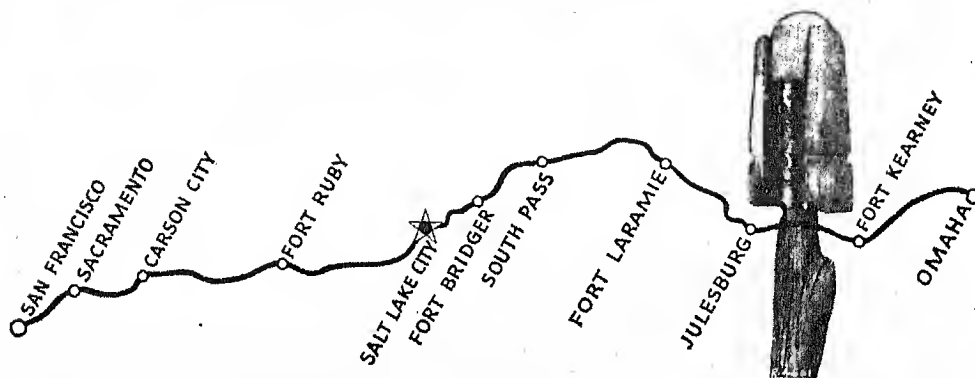


Photo: Western Union

Gradually, telegraph lines were extended as far west as the Missouri River. In the spring of 1860, the Pony Express was organized to speed up communication between the East and the West, but, after operating only eighteen months, it was put out of business by the completion of the first transcontinental telegraph. For most of the way the line followed the historic Pony Express trail. When Hiram Sibley (*lower right*), president of Western Union, told Abraham Lincoln of his decision to build the first transcontinental telegraph, President Lincoln said it was a "wild scheme," that it would be "next to impossible to get your poles distributed on the plains, and as fast as you build the line the Indians will cut it down." However, Edward Creighton (*lower left*) was sent out to survey the route and supervise construction as far west as Salt Lake City. Wagon trains hauled poles, wire, insulators (one of the crude, wooden insulators used is illustrated above), and other needed materials to the men working at each end of the line. Allowed ten years for the job, Creighton and his workmen amazed the world by completing it in three months and twenty days. On October 24, 1861, in a little building (*below*) in Salt Lake City, the lines from the East met those from the West, and the American continent was spanned.



Photos: Western Union

fit them to the ends of the iron rods, so as to form spools. Wind about fifty turns of magnet wire on each rod, winding the two coils in the same direction. The two coils are to stand upright on the base of the instrument, and to rest on a strip of iron. It is better if the strip of iron can be fastened to the rods with machine screws, but this is not necessary. Connect the coils so that, when connected to a battery, the upper end of one rod is a north pole and the upper end of the other is a south pole. The polarity can be tested by means of a pocket compass. Another strip of iron is used for the armature of the magnet. This armature is fastened to an arm of brass or wood. The arm is pivoted, and held up by a rubber band or by a spring made of brass or steel wire. The sounder then appears as in Fig. 1.

A key for opening and closing the circuit can be made of a piece of spring brass or spring steel, or an ordinary bell push button can be used. The key will then appear about as in Fig. 2. Only one line wire is needed. For the ground connections, connect the wires to gas or water pipes. A key and sounder like that shown on page 7060 may be bought for less than five dollars.

The Relay. For long-distance work, the current from a battery, or even from a dynamo, is

weather is about 450 miles; in rainy weather, the limit is from 150 to 250 miles. However, messages are sent in all kinds of weather over distances of thousands of miles. This is accomplished by means of a *relay*. A relay is a contact key which is operated by means of an

electromagnet. It is operated in the same way as a sounder. Suppose that, when the armature of a sounder is pulled down by the magnet, it brings two contacts together and closes another circuit. The sounder would then be a relay. The circuit which is closed by the relay may be hundreds of miles long, or it may be only a few feet. A relay used in this manner to send a message on to a more distant station is called a *repeater*. At the farther end of the second line, there may be a second relay which closes a third circuit. A message may be sent to any desired distance,

by the use of a sufficient number of relays.

The Codes. There are two codes in general use, the Morse and the Continental. The Morse code is used in the United States and Canada, and the Continental (International) code in all other countries. For communication by cable between the United States and other nations, the Continental code is used. The signals of the Continental code consist of dots and dashes; those of the Morse code consist of dots, dashes, and spaces. The letters which occur most frequently have the simplest symbols; for example, the letter *e* is represented by one dot, and the letter *t* by one dash, in both systems. A dot is made by quickly pressing and releasing the key, producing a rapid *click-clack* sound in the receiver. A short dash is twice as long as a dot. A long dash, as for the letter *l*, is equal to four dots. The space between the dots and dashes that make up a letter is equal in length to the dot. The space between the letters of a word is equal to three dots, and the space between words to six dots. A space which is part of a letter combination is equal to two dots.

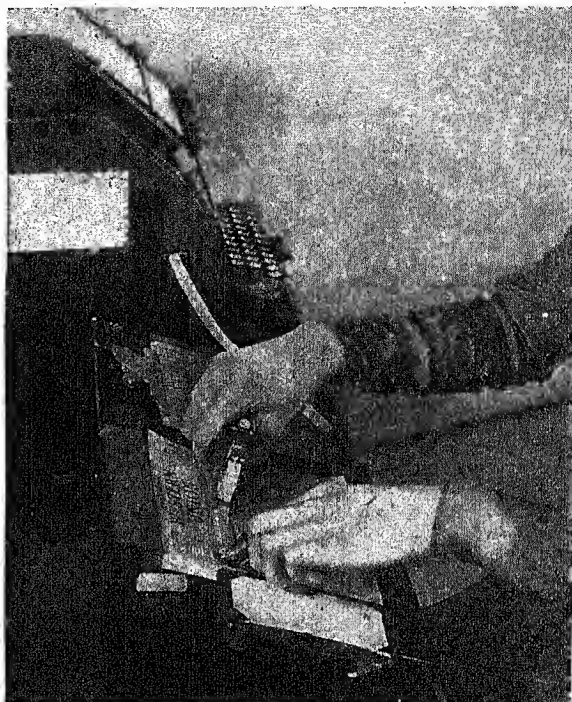


Photo: Western Union Telegraph Co.

THE TELEPRINTER

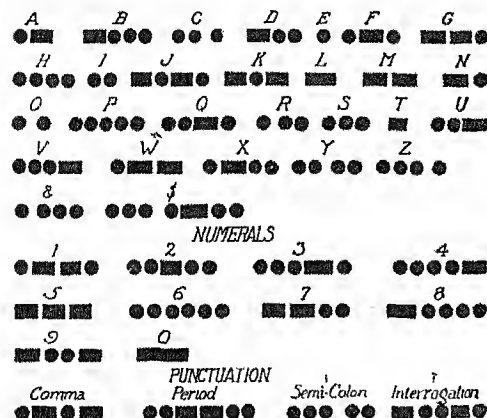


Photo: Western Union Telegraph Co.

MODERN KEY, SOUNDER, AND RELAY

too feeble to operate the sounder. This is true, because of the resistance a long-line wire offers to the passage of the electric current. The practical limit of the single telegraph line in fair

Sending Four Messages at One Time Over One Wire. One of the marvelous achievements in telegraphy is that of sending a number of messages at one time over one wire. One



THE MORSE CODE

Dots, dashes and spaces are employed to form the letters.

electric current can be made to convey four messages simultaneously, two going in one direction and two in the opposite direction, and the messages do not interfere with each other. To send two messages at one time in opposite directions, the instruments must be so arranged that the sounder is in the circuit, but is not affected by the sending instrument at the same station.

A telegraph system by means of which two messages can be so sent at one time is called a *duplex system*. In one duplex system, the making and breaking of the circuit operates the sounder, regardless of the direction in which the current flows. In another system of duplex telegraphy, it is by changes in the direction of the current that the signal is transmitted. When these two systems are combined in one wire, four messages can be transmitted at one time, developing a *quadruplex*, or fourfold system. We may think of the fourfold system as working in the following manner:

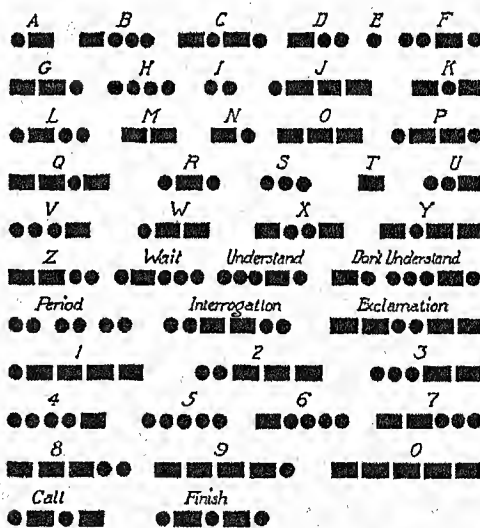
There are two receivers and two sending instruments at each end of the line, all connected to one line wire. They are so arranged that the outgoing messages from station 1 do not affect the receiving instruments at station 1. Messages sent from station 1 affect only the sounders at station 2. A constant current is flowing in the line, but the receiving instruments are so arranged that none of them is moved by this current, unless a change is made either in the direction or the strength of the current. If the direction of the current is changed at station 1, one sounder at station 2 responds with a click, but the other sounder at station 2 is not affected. If the strength of the

current is changed at station 1, the second sounder at station 2 responds. Thus two signals are sent at the same time from station 1 to station 2. In the same way, and at the same time, two signals may be sent from station 2 to station 1.

It is also possible, by attaching four machines to each end of a line, to send eight messages, four in each direction, over a single wire at the same time. This is the multiplex system. By means of an automatic-control device, the sending and receiving operators can instantly communicate with each other, should it become necessary during the transmission of a message. In case of necessity, an automatic circuit may be converted into a manual or Morse circuit by turning a switch.

The multiplex system is ideal for lines between important centers where traffic is heavy and constant, but because of the relatively high initial cost, and the necessity for expert supervision, it is not so well suited to other circuits. The Simplex, or Teletype, system is widely used for circuits carrying a limited amount of traffic.

Use of the Dynamo. For long-distance telegraphy, dynamos are used to supply current to the line. They occupy less space and are more economical than batteries. A generating plant



THE CONTINENTAL CODE

Dots and dashes are employed to form the letters. Spaces are used only to indicate the end of one letter and the beginning of the next.

sufficient to operate a thousand lines may be installed in a small room. The lines may vary in length from 50 to 500 miles.

Batteries. When batteries are used for long-distance work, storage cells are always used. The gravity, or Daniell, cell is used for local

circuits only, and even for local circuits, storage cells are frequently used.

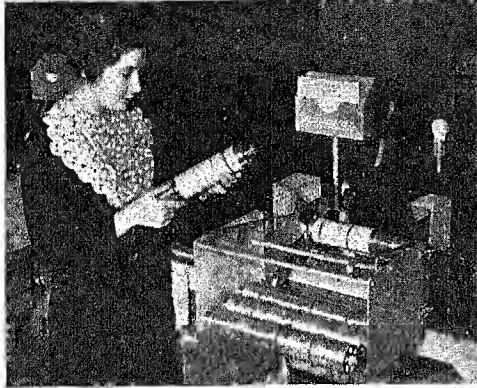


Photo: Western Union Telegraph Co.

SENDING TELEGRAMS BY FACSIMILE SYSTEM

Facsimiles by Telegraphy. The first regularly operated telegraph circuit handling facsimile messages was placed in operation in 1935 between New York and Buffalo, and the second such circuit was placed in commercial service between New York and Chicago in 1936.

Telegrams to be transmitted are mounted on a cylinder which, revolving on a horizontal axis, rapidly passes under an electric "eye." As the characters of the message pass under the beam they reflect varying amounts of light. These gradations of light produce tiny signals which are magnified billions of times in their telegraphic transmission to the receiving machine

that is at the other end of the telegraph line.

At the receiving end is a machine similar to the one at the sending end, except that the electric "eye" is replaced with a small stylus which passes over the surface of a receiving blank mounted on a revolving cylinder. The electrical impulses, or signals, coming over the telegraph line, are received on this stylus and as the variations of the current pass through it, an immediate color change is produced upon that part of the paper which is in contact with the stylus. As an example, a page of drawings or written matter can be sent from New York and received in Chicago in seven minutes.

The above described method was employed by Western Union engineers in developing the Automatic Telegraph, known as "The Telegraph of Tomorrow," which was first introduced at New York in 1939. The Automatic Telegraph, operated between public places and the nearest telegraph main office, provides the easiest method ever known for the transmission of a telegram. The person wishing to send a telegram merely pushes a button, and then drops the telegraph blank on which he has written his message into the Automatic Telegraph cabinet, about the size and shape of a mail box. Electricity does the rest. The same principle is employed by Western Union in sending news and fashion photographs by cable between London and New York.

Telegraphing without Wires. See RADIO COMMUNICATION.

Submarine Telegraph. See CABLE, SUBMARINE.

Historical Sketch

A telegraph consisting of a system of semaphore signals was used in the latter part of the eighteenth century. France had the most extensive system of this kind, connecting Paris with all the principal cities of the country, a semaphore every three miles. In those days, the device was considered wonderful, as indeed it was.

Benjamin Franklin was the first to conceive the idea of telegraphing by means of electricity, and to leave a record of his experiments. He tried the experiment with four miles of wire, but the electric battery was then unknown, and the discharge from an electrical machine or a Leyden jar could not be used for a practical telegraph.

The timely invention of the electric battery in the last year of the eighteenth century revived the idea of an electric telegraph. Every known means of producing an electric current or a static electric charge, and every known effect of an electric current up to the time of Morse's invention, had been used in attempts to invent a telegraph. No success

was possible, however, until the electromagnet had been discovered and perfected. This discovery was made by Sturgeon, in 1825, but for some time it remained a crude device.

The discovery (1820) of Hans Oersted (1777-1851), a Danish physicist, that an electric current flowing along a wire will cause a compass needle to turn, when the wire is held in a certain position over the needle, led to the invention of the needle telegraph. In the needle telegraph, the receiver was simply a magnetic compass placed in a coil of wire. When the circuit was closed at the sending end, the needle moved; the movements of the needle indicated the letters of the alphabet. A number of needle telegraphs were invented, and some of them were used commercially. The Cooke and Wheatstone needle telegraph was employed in England as late as the year 1870, but it was not successful over long distances.

The device that made long-distance telegraphy possible is due to Joseph Henry, whose discovery consisted of a means of increasing the strength of an electromagnet by winding



Photos: Western Union Telegraph Co.

Sending and Receiving a Cablegram. Above, the operator is sending a message over an Atlantic cable. Below, on the other side of the ocean another operator is receiving the transmission. Reception is automatic and basically like that employed in landline operation.



Photo: Western Union Telegraph Co.

STEAMSHIP "GREAT EASTERN" LAYING THE ATLANTIC CABLE

From a poster made at the time of the laying of the first successful cable between the United States and Europe. The portrait is that of Cyrus W. Field. [See CABLE, SUBMARINE.] Thus the telegraph began to find its way around the world.

many turns of insulated wire upon the coil, so that even a feeble current would produce considerable magnetic strength. The idea of putting the electromagnet to practical use occurred to the American painter, Samuel F. B. Morse, in October, 1832, while he listened to a fellow-traveler's account of Henry's experiments aboard the packet ship *Sully*, on which he was returning from Europe. Aided by Professor Leonard Gale of New York University, he devised a system which, by making it possible to transmit a message electrically through ten miles of wire, was the beginning of the modern telegraph.

Morse found a financial backer for his enterprise in Stephen Vail of Morristown, N. J., and an able technical collaborator in the latter's son Alfred. Vail was convinced of the feasibility of the invention after watching in 1838 the transmission of messages on apparatus installed in the Speedwell Iron Works. Alfred Vail perfected such features as the recording lever, key, and sounder. He also devised the dot-and-dash code.

After securing his first patent in 1840, Morse attempted to convince other wealthy men of the value of his invention, but because the country was passing through a financial depression he was unable to interest private investors. Finally, in 1843, Congress appropriated \$30,000 for the construction of a test line between Washington and Baltimore. On May 24, 1844, an epoch-making experiment was held in the Supreme Court chamber of the Capitol, with Morse tapping out the Scriptural message—"What hath God wrought." Vail, who was at the receiving end in Baltimore, repeated the message. A report of the Democratic national convention, nominating James K. Polk for president of the United States, was published a few days later in a Washington newspaper under the heading "Telegraphic News." J. C. Wu.

Related Subjects. The reader is referred to:

Cable, Submarine	Radio Communication
Communication	Stock Ticker
Electricity	Telautograph
Henry, Joseph	Telephone
Morse, Samuel F. B.	Teletype

TELEGRAPH, WIRELESS. See RADIO COMMUNICATION.

TELEGRAPH PLATEAU. See ATLANTIC OCEAN; OCEAN (Bed).

TELEMACHUS, *te lem' a kus.* See ULYSSES; MENTOR.

TELEPATHY, *te lep' ah thee,* the influencing of one mind by another at a distance, without the use of ordinary means of communication. Telepathy rests upon clairvoyance (which see) for its foundation. The mind is aroused to action in two ways: by impressions received through the senses, and by intuition. The mind when acting upon impressions received through the senses is considered as the *objective mind*; when acting from intuition, the *subjective mind*. Telepathy is possible only when each mind concerned is in a subjective state. Furthermore, there must be a bond of sympathy between the persons.

Those who argue in favor of telepathy claim that when two people, A and B, are in the same room, the mind of one acts upon the mind of the other in such a way as to produce the mental results desired by A upon B, without any words, looks, or other visible means of communication. A good illustration of this is found in the old game of "Willing." A wills that B perform a certain act, and B complies without any visible sign of communication. The Society for Psychical Research, after extended investigation, decided that in most cases there is some means of communication which the observer is not able to detect, because when the persons are in separate rooms, the instances of success are no more than can be accounted for by chance. For instance, A wills that B write the number 10 on a card. There is a chance that A and B may be thinking of the same number, and that the number 10 will be written. On the other hand, there is a strong probability that they will not be thinking of the same number, unless there is collusion. The experiments referred to showed ninety cases of success with A and B in the same room, when chance should allow only eight. With A and B in different rooms, the instances of success were no more than could be accounted for by chance.

Those who accept the hypothesis of telepathy make use of it to account for warnings and messages from distant friends, in times of special stress or danger, and to account for other similar phenomena.

There is a wide difference of opinion concerning the validity of the hypothesis on the part of those who have given the subject careful study. Some reject the theory entirely, while others believe that some evidence in its favor is "tangible," though not sufficient to warrant a full acceptance of the hypothesis.

Relating to Various Beliefs. The articles on the following topics may be of interest in this connection:

Alchemy
Astrology
Clairvoyance
Conjuring
Demonology
Divination
Faith Cure
Hypnotism
Magic
Medium
Mesmerism
Mind Reading
Necromancy

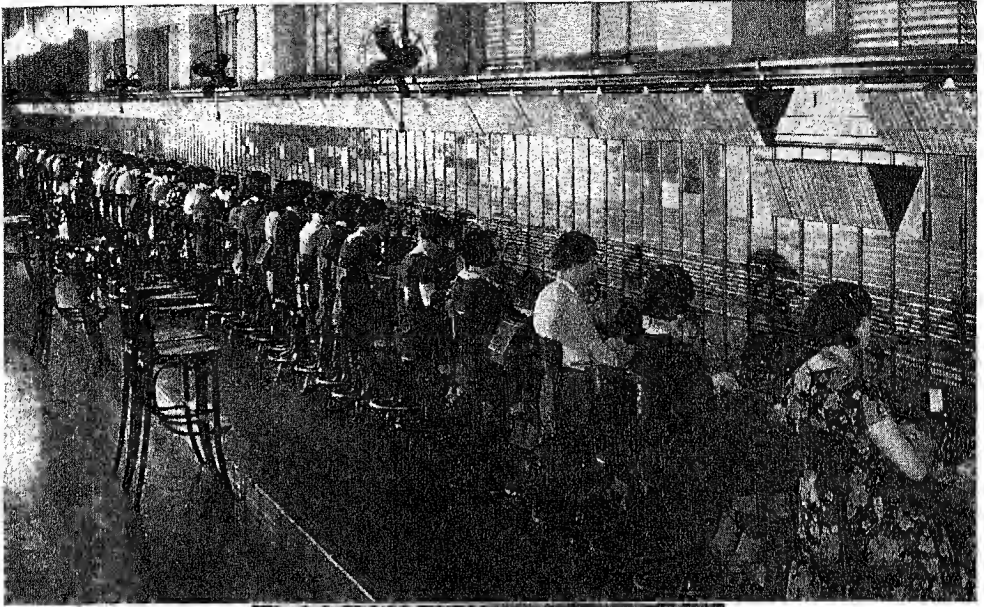
Occult
Palmistry
Phrenology
Physiognomy
Psychical Research
Psychoanalysis
Spiritualism
Subconscious
Suggestion
Superstition
Theosophy
Witchcraft

TELEPHONE, *tel' e fohn.* Until June, 1875, there were no telephones; there was only the *idea* of the telephone in the mind of young Alexander Graham Bell. Today, the people of the United States alone make an average of more than ninety million telephone calls every day. Thus within the span of one man's life the telephone has grown from a mental concept to the most commonly used means of communication in this country.

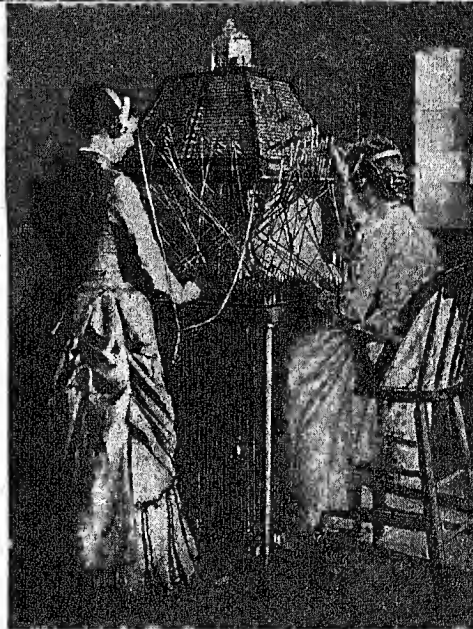
Early History. After the invention of the telegraph, a number of inventors tried to transmit human speech itself over the wire, instead of merely signals. But they were all working on the wrong principle. Alexander Graham Bell (1847-1922), a young Scotchman, who had come to Canada and then to Boston, working on a different principle, discovered how to use electricity for the transmission of speech by means of the undulating current, and on June 2, 1875, produced an instrument that would transmit the overtones of speech. He thereby made talking by electricity possible.

On March 7, 1876, the United States Patent Office granted Bell a patent for his invention. This has been called "the most valuable patent ever issued by any country." About the same time, March 10, 1876, Bell succeeded in improving his instrument so that it would transmit and receive speech clearly and dependably, thus making the invention practical for general use. In April, 1877, the first telephone line was installed between Boston and Somerville, and in May the first pair of telephones was rented to a man named Emery, of Charlestown. There was at first no telephone exchange for intercommunication. The first switchboard was devised by E. T. Holmes in the spring of 1877, "to show the telephone to Boston," and for two weeks he connected five banks of his burglar alarm system with each other. The first regular commercial telephone exchange was opened by George W. Coy on January 28, 1878, in New Haven, Conn.

Considering that the telephone was an entirely new thing, the early business development under the guidance of Gardiner G. Hubbard and Thomas Sanders was rapid. The first organization, a simple trusteeship with Hubbard as trustee, was formed in July, 1877, and issued the first stock to its seven shareholders on August 1, 1877. The business began with



agencies in different cities and towns, renting pairs of telephones to subscribers under licenses from the company. In May, 1878, Theodore N. Vail was secured as general manager, to take charge of the expansion of the business. It spread rapidly. The Western Union Telegraph Company, claiming that Bell had invented merely an instrument, undertook to add a telephone service to its telegraph service, using instruments invented by Thomas A. Edison and others. The Bell Telephone Company sued for infringement, though the Western Union was at that time the largest corporation in the world. As a result, on advice of its own counsel, the Western Union admitted the validity of the Bell patents and on November 10, 1879, signed an agreement leaving the telephone field to the Bell Company. Before the telephone patent



Photos: Bell Co.; Keystone

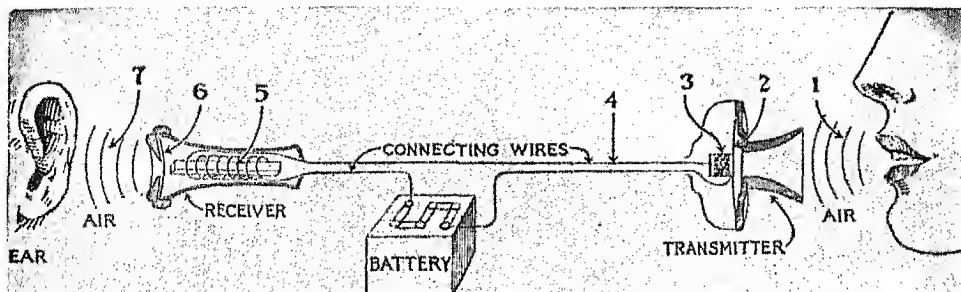
TODAY AND YESTERDAY

Below is shown a switchboard which when installed in Richmond, Va., in 1882, served the needs of the twenty-five telephones that the city contained. It had capacity for expansion to serve about two hundred subscribers. Above, a modern switchboard, with its many operators and supervisors.

expired, about 600 other lawsuits were brought against infringing companies organized for the purpose of selling stock to the public until they should be estopped by judicial injunction. The Bell Company won them all.

Meantime the profession of telephone engineer was growing up. Beginning with Thomas A. Watson, who as a young mechanic helped Bell with his experiments, the art of telephony has developed until now its research is conducted by a highly technical organization, the Bell Telephone Laboratories. Bell's original telephone instrument remains, unchanged except in form, as the receiver of the present. Important improvements by

Emile Berliner, Thomas A. Edison, Francis Blake, and Anthony C. White, produced a transmitter of the microphone type. Watson's



SIMPLEST TELEPHONE CIRCUIT

Photo: American Telephone and Telegraph Co.

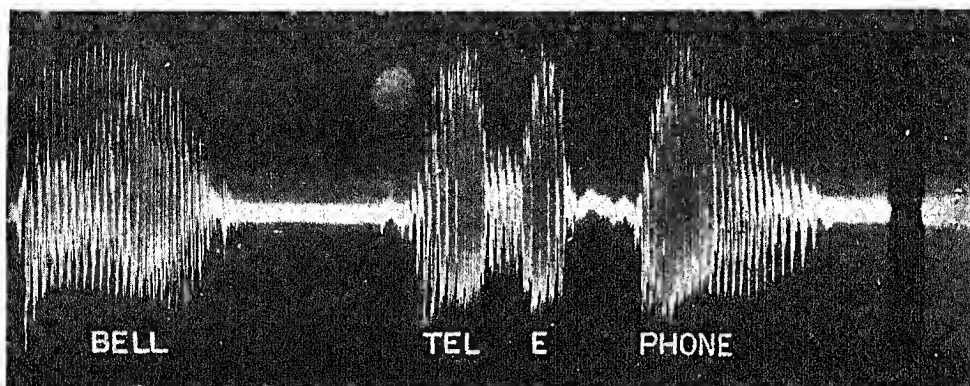


Photo: American Telephone and Telegraph Co.

A MAGNIFIED PHOTOGRAPH OF THE UNDULATING ELECTRIC CURRENT

It is the electrical counterpart of the sound waves entering the transmitter and coming out of the receiver.

polarized call bell, still used practically unchanged, was an early improvement. Thomas B. Doolittle's invention of hard drawn copper wire resulted in abandoning the iron wires of telegraphy, with resulting improvement in transmission over longer distances. John J. Carty's application of Bell's idea of the metallic circuit did away with the noisy grounded circuit.

The successful development of paper insulation was an important step in making the telephone cable possible and led to the putting of telephone wires, in cables, underground.

Progress of the Telephone Art. Telephone engineers have overcome one by one the barriers of speech transmission. From the very beginning progress has been marked by epoch-making advances due to inventions and improvements in apparatus and equipment. Some of the more notable achievements in the development of the art have been as follows:

The development of the switchboard without which no interconnecting group of telephones would be possible, which was the beginning of the telephone exchange system.

The discovery of the process of hardening copper wire and its application to telephone circuits, improving transmission and making long distance telephone circuits possible.

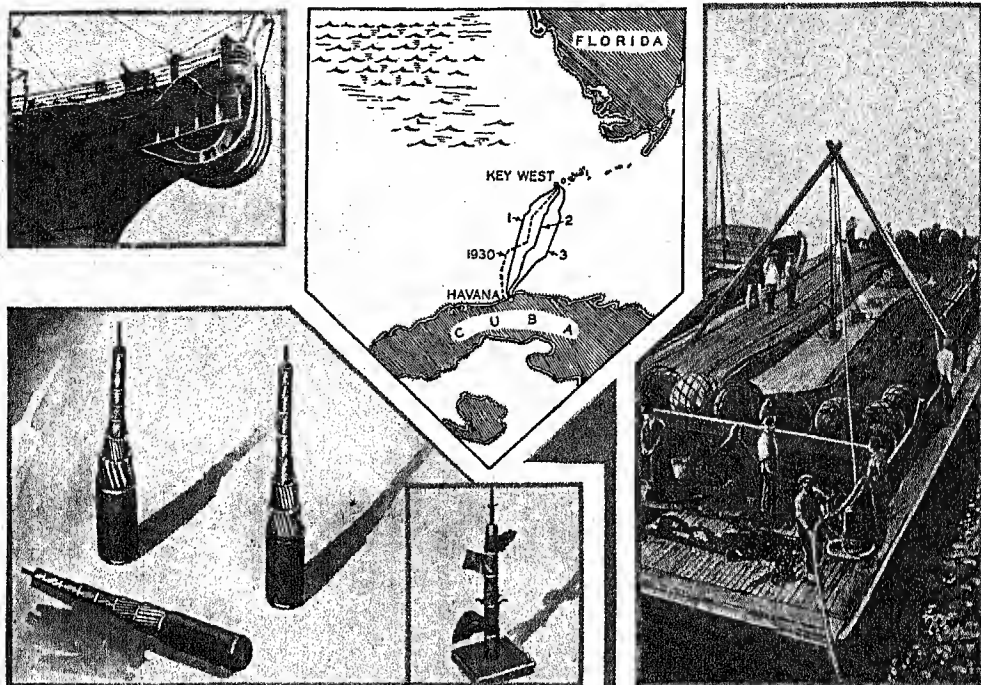
The substitution of a pair of wires for a single wire with ground return, thus very much reducing the disturbances caused by adjacent power circuits or other telephone circuits and greatly improving transmission.

The multiple switchboard, making possible the expansion of the exchange system by providing positions at the switchboard for a large number of operators, each answering the calls on a certain number of subscribers' lines, and because of the duplication of all the subscribers' line terminals at each section of the switchboard, each operator is able to connect the calling subscriber with any other subscriber in the same central office, whether one thousand or ten thousand.

Successive improvements in the design of the telephone instrument, not only increasing its efficiency as a means of communication, but giving it a more attractive appearance. The early "box" telephones were superseded by various types of wall and desk sets. Now the convenient and graceful hand telephone is made available, with or without the dial.

The transposition of telephone circuits, thereby minimizing the interference with other telephone circuits and of high power electric light and feed wires.

The development of the underground cable,



LAYING DEEP SEA TELEPHONE CABLE

The dotted line on the map shows the course of the cable, 127 land miles long, from Havana to Key West, across the mile-deep Florida Straits. In the center below is a segment of the message-carrying core of the cable: a central insulated copper wire wound with spiral copper tape. At the right is shown a few miles of the cable coiled on a barge for laying at the shoreward end, with some of the buoys used to mark the course. At the left are sections of the cable showing the several types of armor protecting it at varying ocean depths, and above these is the bow of the cable ship Neptune.

enabling the removal of pole lines from the main thoroughfares of the large cities, and the aerial cable, reducing the number of cross-arms and the size of the poles.

The phantom circuit, which is made possible by utilizing two physical telephone circuits to create a third independent circuit.

Carrier-current telephony, in which the telephone current is combined with a high-frequency current, transmitting this combination over a line wire and at the receiving end removing the high-frequency current and leaving the telephone current, making it possible to transmit simultaneously several telephone currents over a telephone circuit.

The application of the repeater or current amplifier to long distance circuits, further increasing the range of long distance telephony; also, its application to overhead and underground cables, making it possible to extend greatly the use of cables in place of open-wire construction and also allowing the use of smaller gauge wire. General improvement in speech transmission was also accomplished.

The range of possible use of cable has been gradually increased until by 1920 conversation was possible through 2,000 miles of cable.

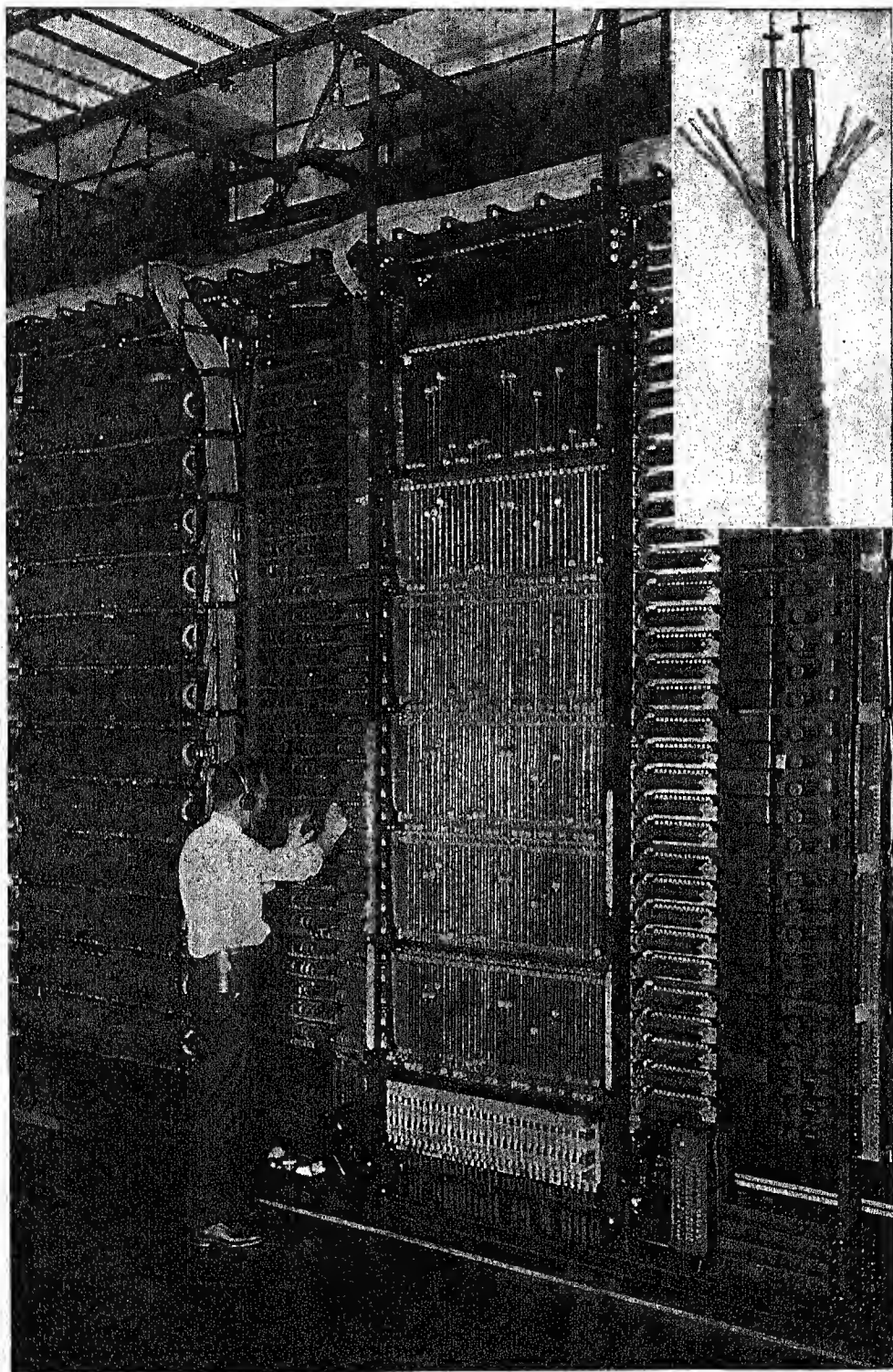
Methods have since been developed to make conversation through 15,000 miles of cable practically as good as a conversation from one room to another in the same building.

Improvements in the design and in the methods of manufacture of cables for local exchange use have made it possible to increase greatly the number of wires which may be within a cable sheath of given size. By employing wires of smaller diameter than those heretofore used, the maximum number has been still further increased, until now as many as 2,121 pairs of wire are carried in a single cable.

Improvements in dial telephone apparatus and systems, enabling dial telephones to be used more advantageously in large metropolitan areas as well as in smaller cities and communities.

The discovery of the new magnetic alloys—permalloy and permivar. The former has revolutionized the submarine telegraph cable art by permitting speeds five times greater than before. It has also made possible reducing the size of loading coils and is employed in telephone apparatus.

Developments in submarine cables including the use of single conductor cables, the telephone



Details of Machinery of an Automatic Switchboard. An incoming "selector frame" in a dial central office. Insert, a section of coaxial cable, through which hundreds of telephone conversations can be transmitted simultaneously.

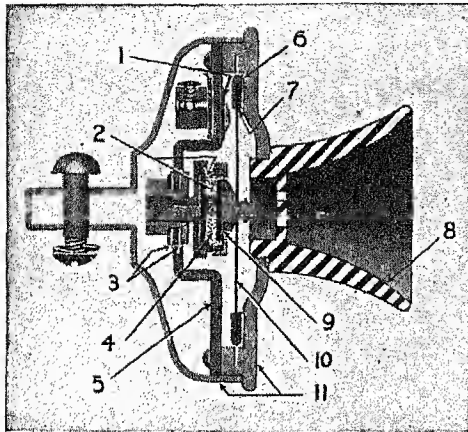
amplifiers, and terminal telegraph apparatus and the devices for permitting the telephone and

which one listened. Nowadays telephone not only covers the instrument itself but includes the entire intercommunication equipment which makes it almost literally possible for anyone, anywhere, to talk with anyone, anywhere else, at any time.

The Transmitter. While experimenting with a "harmonic telegraph" in 1875, Bell first voiced his conception of the telephone when he declared: "If I could make a current of electricity vary in intensity precisely as the air varies in density during the production of sound, I should be able to transmit speech telegraphically." That is exactly what Bell accomplished in 1876, and it is the fundamental principle of telephone operation today.

Sound is the result of a variation in air pressure which sets up a succession of air waves. These waves, striking the ear, cause the ear drum to vibrate back and forth in response to the increase and decrease in pressure of the air waves upon it. These vibrations are carried by nerves to the brain, which recognizes them as the different kinds of sound.

In essence, the telephone transmitter is an electrical ear. Directly in back of the mouthpiece is a thin metal diaphragm which vibrates in response to the changing density of air pressure caused by the air waves set in motion by the voice of the person speaking into the mouthpiece. As the diaphragm vibrates, it changes the pressure on thousands of tiny carbon granules grouped in back of it, crowding these granules closer together when air waves from the speaker's voice force the diaphragm



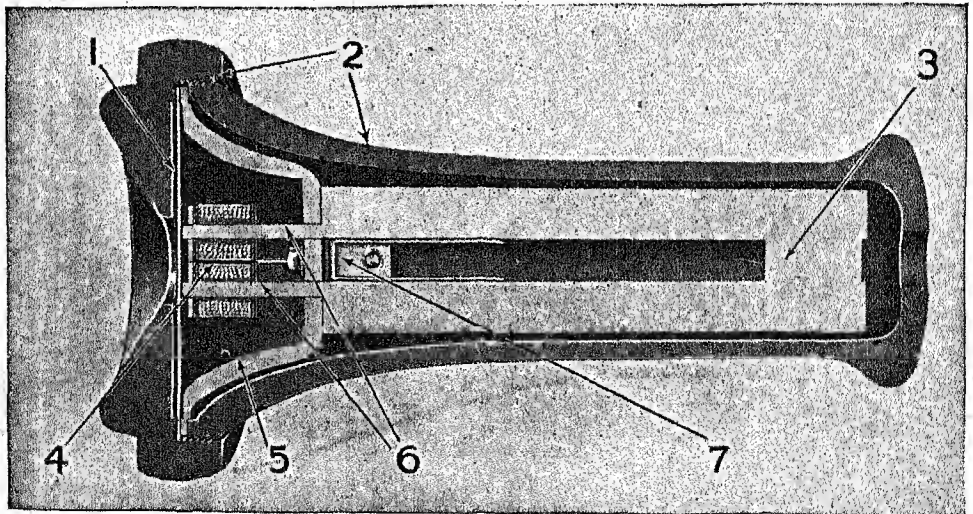
LONGITUDINAL SECTION OF TRANSMITTER

(1) Hard-rubber insulator. (2) Carbon electrodes. (3) Mica insulators. (4) Granular carbon. (5) Galvanized steel bridge. (6) Waxed paper. (7) Rubber insulator. (8) Electrose mouthpiece. (9) Mica diaphragm. (10) Aluminum diaphragm. (11) Brass, nickel-plated.

telegraph to operate simultaneously, all differing radically from past practice.

The perfection of apparatus to transmit directly photographs, drawings, signatures, and finger-prints over telephone lines.

Originally the word *telephone* referred only to the instrument into which one spoke and to



LONGITUDINAL SECTION OF TELEPHONE RECEIVER

(1) Diaphragm of ferrotype iron, japanned to prevent rust; the separation between diaphragm and pole pieces held to close limits. (2) Case and cap, of highest-grade hard rubber. (3) Welded magnet, of special selection of magnet steel. (4) Removable form-wound coils. (5) Brass cup, airtight. (6) Pole pieces of high-grade magnetic iron, welded to magnet; the ends are lacquered, to prevent rust. (7) Concealed binding posts.

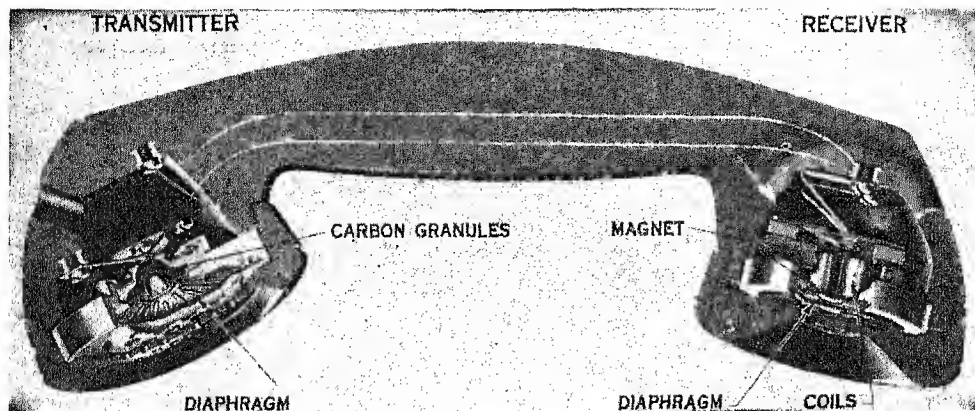


Photo: A. T. & T.

LONGITUDINAL SECTION OF A HAND SET

Showing details of construction of transmitter and receiver as combined in a modern hand set.

in, releasing the granules a little as the diaphragm moves back. Through the granules flows a small electric current from a battery, and as the pressure on them changes, the strength of the flow of current changes; for when the granules, which are conductors of electricity, are more tightly crowded together, more current can flow through them, and when they are loosened, less current can flow. In this way the vibration of the diaphragm, responding to the air waves set in motion by the spoken word, causes the current flowing through the carbon granules and thence out along the telephone wires to "vary in intensity precisely as the air varies in density during the production of sound."

Since an electric current flows through copper wire practically at the speed of light, the constant variations in the current set up at the transmitter reach the distant receiver almost instantaneously. Here the process observed at the speaker's transmitter must be reversed: the varying current of electricity must be transformed into sound waves identical with those which caused the current to vary. These sound waves will reach the listener's ear as the duplicates of the speaker's original words.

The Receiver. The receiver consists principally of a magnet, with coils of fine wire wound around it, and attached to its end, near the ear-piece, is a thin metal diaphragm. The varying current flows through the coils of wire around the magnet, and sets up within the magnet a magnetic field which is constantly varying, stronger or weaker as the surrounding current is stronger or weaker. The pull of the magnet upon the diaphragm varies correspondingly, and causes the diaphragm to vibrate rapidly in and out. This vibration, in turn, sets up variations in the density of the air which reach the listening ear as sound waves identical in every respect with those which caused the

diaphragm to vibrate in response to the words of the distant speaker.

This basic principle of operation is the same for the three usual types of telephone instruments: that fastened to the wall, where the transmitter is stationary and the receiver is held to the ear; the desk type, where the transmitter is part of the stand and the receiver is held to the ear; and the hand type, where transmitter and receiver are combined in a unit which is raised to a position convenient to both mouth and ear.

There may be one telephone instrument or many at a subscriber's premises, but the equipment needed in addition to transmitters and receivers consists normally of signalling appa-

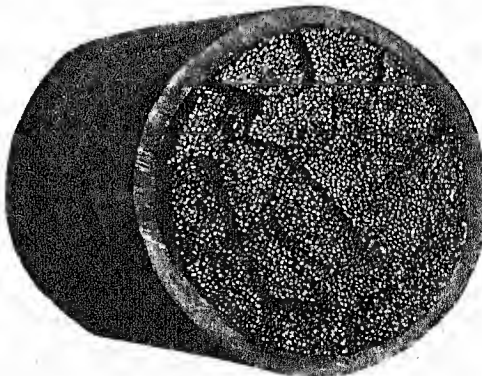
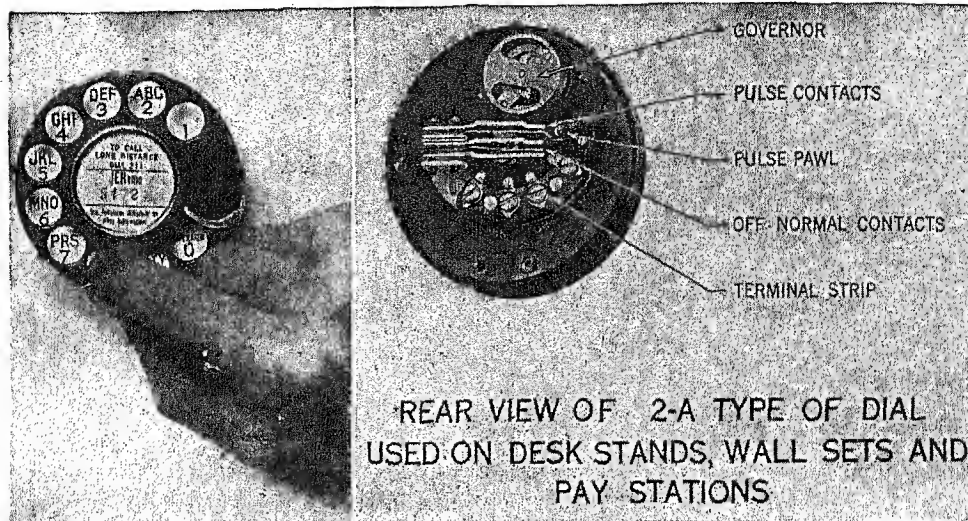


Photo: A. T. & T.

A NEWLY DEVELOPED TELEPHONE CABLE

A cross-section shows the 2,121 pairs of wires contained in this large cable. Each wire is insulated by a thin strip of paper, and each pair of wires connects a subscriber with the telephone exchange.

ratus to indicate incoming calls and the wiring to connect the instruments with the lines to the central office. In large establishments, provi-



Photos A. T. & T.

AUTOMATIC TELEPHONE TRANSMITTING DEVICE

Beginning to dial the number 8. The same motions are made in dialing the first three letters of the station to be called. At right, rear view of the dialing apparatus.

sions are generally made for intercommunication among the various instruments without the necessity for connection through the central office.

The Dial Telephone. Dial telephone service differs from "manual" telephone service in the way in which the calls are placed and in which the connections are made in the central office; the operation of the transmitter and receiver is the same as in manual telephone instruments.

The dial, which is mounted as a part of the telephone instrument, consists of a disc which may be rotated about an axis, with finger openings through which may be seen the ten figures 1 to 0 and also certain letters of the alphabet. To make a call, the user lifts the receiver, places his finger in the opening of the dial through which is visible the first letter or figure of the telephone number to be called, and turns the dial until his finger strikes a stop. He then withdraws his finger, and a spring causes the dial to turn back to its normal position. Each letter and figure of the desired telephone number is dialed in the same way.

Connected with the dial is a toothed-cam. When the user lifts the receiver, a steady current flows between the telephone instrument and the central office, and as the dial returns to its normal position, the cam interrupts the current the same number of times as the figure dialed: thus, three interruptions for the figure three. For the figure zero the cam interrupts the current ten times. These breaks in the current, or impulses, transmitted along the wire to the apparatus in the central office, there operate relays, switches, and other delicate mechanisms which cause the apparatus to

select the line of the called number and connect it and the line from the instrument which dialed that number.

The Switchboard. The first telephones were leased in pairs. Connected by wire, two telephones made possible a conversation between persons at a distance, *but only through those two telephones.* It was not until the invention of the switchboard, which enables one telephone instrument to be connected with any other, that telephone service was able to enter upon the field of usefulness which it occupies today.

In small communities the switchboard may be of the magneto type. The person wishing to make a call removes the receiver and then turns a handle which operates a magneto. This generates a current which, carried by wire to the central office, causes a visual signal to move on the switchboard in front of the operator. She takes a connecting cord, plugs one end of it in the terminal of the calling subscriber's line beneath the signal, and asks for the desired number. Upon hearing it, she plugs the other end of the connecting cord into the terminal of the called line and turns a magneto handle to generate current which rings the bell at the called telephone. Batteries to supply the talking current are installed at the subscribers' premises.

The common battery switchboard is so called because the batteries for talking current are maintained at the central office, as is the power supply for ringing the telephone bells. With this type of switchboard, lifting of the receiver at the calling instrument causes a light to flash on the switchboard beside the terminal of that line. The operator plugs in on the line with one

end of the connecting cord, hears the desired number, and completes the connection by plugging the other end of the cord into the terminal of the called line. On some types of switchboards, she rings the bell at the called telephone by pressing a ringing key; on other types, the bell rings automatically as soon as the connection is completed.

The most important advance in the development of the switchboard was the application of the "multiple" principle, made necessary as the number of telephones in the larger communities increased rapidly. At a switchboard serving several thousand subscribers, only a limited number of "incoming" lines terminate at one operator's position, but each one of these lines must be capable of connection with any of the several thousand other lines at that switchboard. Therefore the "outgoing" terminals of all subscribers' lines are duplicated or "multiplied" on every section of the switchboard and are thus within reach of every operator. A switchboard having a capacity to serve 6,000 subscribers' lines and consisting of twenty sections therefore has 120,000 points of connection.

Because these operations are performed by hand, switchboards such as those described are called manual switchboards.

While the dial apparatus in the telephone central office bears no visible relation to a manual switchboard, its function is to perform electromechanically what the operator does by hand: the connecting of telephone lines one with another.

The electrical pulses caused by turning the dial at the calling instrument operate a series of relays and switches which control "selectors" and "connectors." These choose the route to the proper central office (in a city served by more than one central office), pick out the called line, and complete the connection between the two lines. As soon as the connection between the two lines is established, the bell at the called number rings automatically.

In large cities, it is impossible to serve all telephone subscribers at one switchboard (or through one dial unit) in one central office, and it is therefore necessary to divide the telephone lines among two or more central offices. New York City, for example, is served by more than 200 central offices.

Each line must be capable of connection with every other line, however, and this is accomplished by "trunking" calls between the various central offices. When an operator, answering a signal at her switchboard, finds

that the call is for a telephone which is not served by that switchboard, she passes it through a trunk line to the central office which serves the called line, and the connection is completed by an operator at the second switchboard.

A dialed call going from a line served by one dial unit to a line served by another dial unit is completed automatically by the apparatus of the dial units involved. When a call is made over a line served by a dial unit to a line in another central office served by a manual switchboard, the dial impulses must be translated into signals which the operator can understand, in order that she may complete the connection.

This is accomplished in either of two ways. When the "call indicator" is used, the dialed pulses cause the figures of the called number to appear on a ground glass screen before the operator. In another type of device, the dialed pulses operate a device termed the "call announcer" which automatically speaks the called number in the operator's ear. In either case, she completes the connection at the switchboard in front of her. In the opposite situation, when a call is received by an operator at a manual switchboard for completion to a line served by a dial unit, she makes the connection either by dialing the called number or by operating keys which accomplish the same result.

Switchboards are not confined to telephone central offices. They are found in hotels, stores, offices, factories, and other large organizations. Through them are handled not only incoming and outgoing calls, over lines connecting with the telephone company's central office, but also the many calls among the personnel of the organization they serve. These switchboards may be wholly manually operated, or may include certain of the automatic features of dial service. Switchboards used by some large commercial organizations have as many lines and terminals as are needed for telephone service in a small city.

Separate switchboards are used in handling long distance calls. From the long distance switchboard in each city radiate many direct

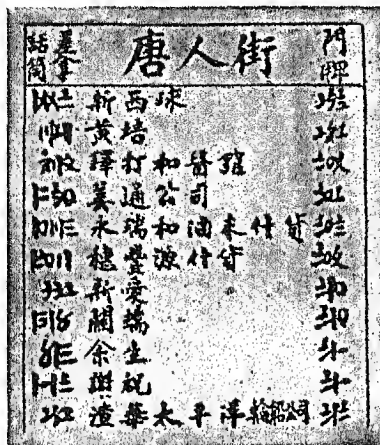


Photo: A. T. & T.

CHINESE TELEPHONE DIRECTORY

A page of a directory issued for Chinatown in San Francisco.

lines to other cities, and a connection between two such places is established by the operators at the long distance switchboards in each. When a call is made at a long distance switchboard for a place to which there is no direct line, the operator "builds up" a line by reaching a long distance operator at an intermediate point and asking her to continue the connection from her switchboard on to the called place.

Other Equipment. There is much equipment in a telephone central office in addition to the switchboards.

Except in small communities, the telephone wires are concentrated in cables as they reach the central office, and are brought into the building through a cable vault. Thence they run to the distributing frames, where they are again separated into individual lines, so that each line may be connected to any section of the switchboard. Batteries for talking current, ringing machines, emergency power supply, and other apparatus are housed within the building, as is also the wire chief's equipment for testing the lines, locating the source of telephone "trouble," and maintaining the equipment in good working order.

Telephone Lines. Between the central of-

fice and each subscriber's telephone instrument runs a pair of copper wires, constituting the "telephone line." The wires may extend the entire distance as a separate pair, supported on poles. They may leave the central office with other pairs in an underground cable, which later emerges to become an aerial cable. In a large city, they may be one of 1,800 pairs of wires, in a lead-sheathed cable scarcely thicker than a man's wrist, which continues underground for its entire extent.

Connecting the cities and towns of this country is another network of telephone lines. Many of them are pairs of bare copper wire, borne on poles from town to town, city to city. Where many lines follow the same route, they may be protected within a cable, likewise carried on poles. Certain cables cover hundreds of miles in conduits buried underground.

On a long telephone line, the telephone current gradually lessens and would become too weak to operate the diaphragm in the receiver at the far end of the line if some means were not used to reënforce or "step up" the current at definite points along the line. This is accomplished by the "repeater," a vacuum tube amplifier not unlike those used in a radio broadcast receiving set. Several repeaters are used in the telephone line between New York and San Francisco, for example.

Within the tube, in vacuum, are three electrodes: a filament, a grid, and a plate. When heated, the filament emits electrons (negative particles of electricity). These are attracted to the positively charged plate. The electrons pass through the grid to reach the plate. A variation in the potential of the grid affects the quantity of electrons which reach the plate. The control of the grid is minutely sensitive, and the weakened current coming along the line

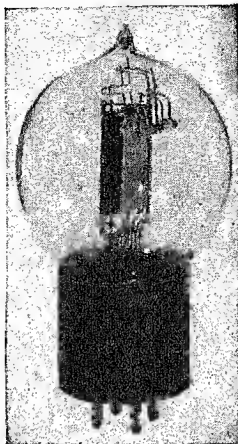


Photo: A. T. & T.

REPEATER TUBE
Used in long distance telephony.

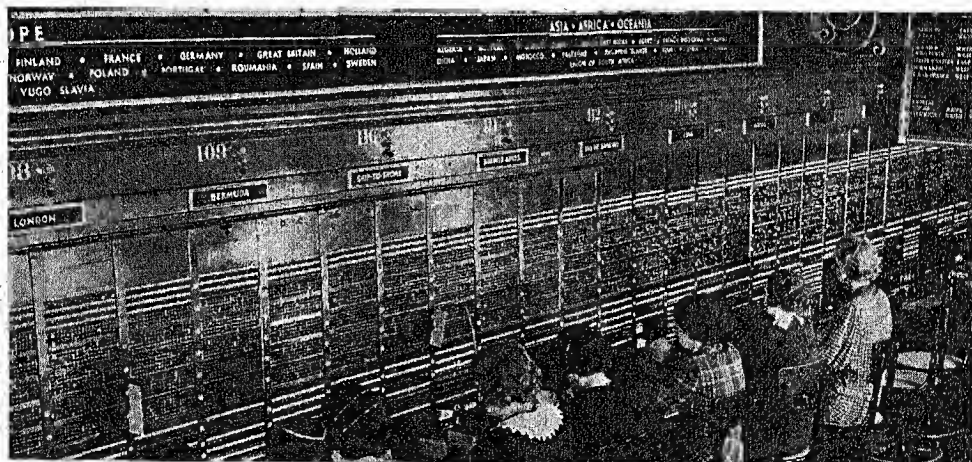
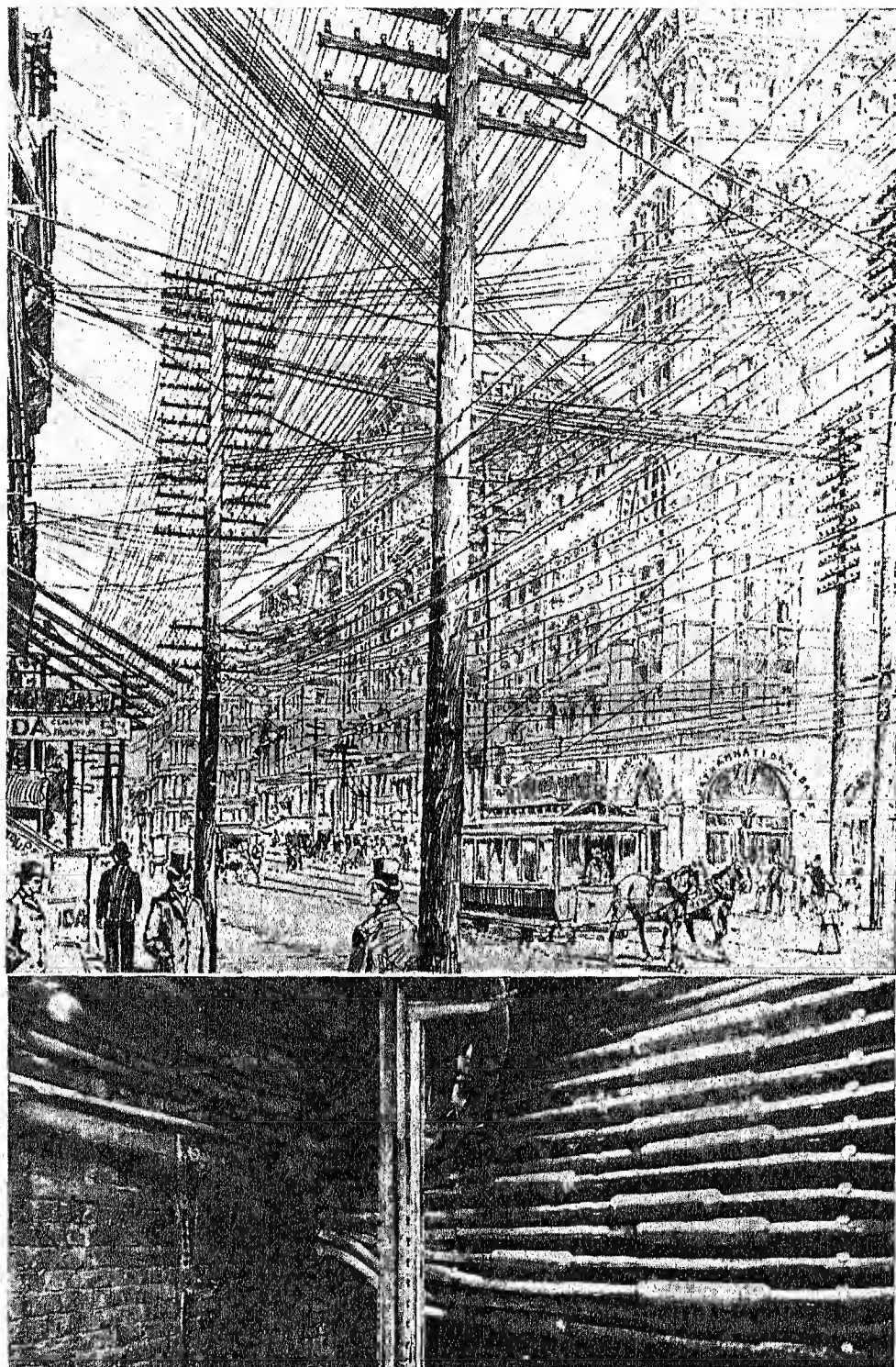


Photo: A. T. & T.

SWITCHBOARD FOR OCEANIC SERVICE AT LONG DISTANCE HEADQUARTERS IN NEW YORK



Photos: Bettman; Bell Telephone Co.

Then and Now. In the days of horsecars, Broadway, in New York City, was an unsightly network of telephone posts and wires. Today underground cables, encased in large metal tubes, hide the wires from view.

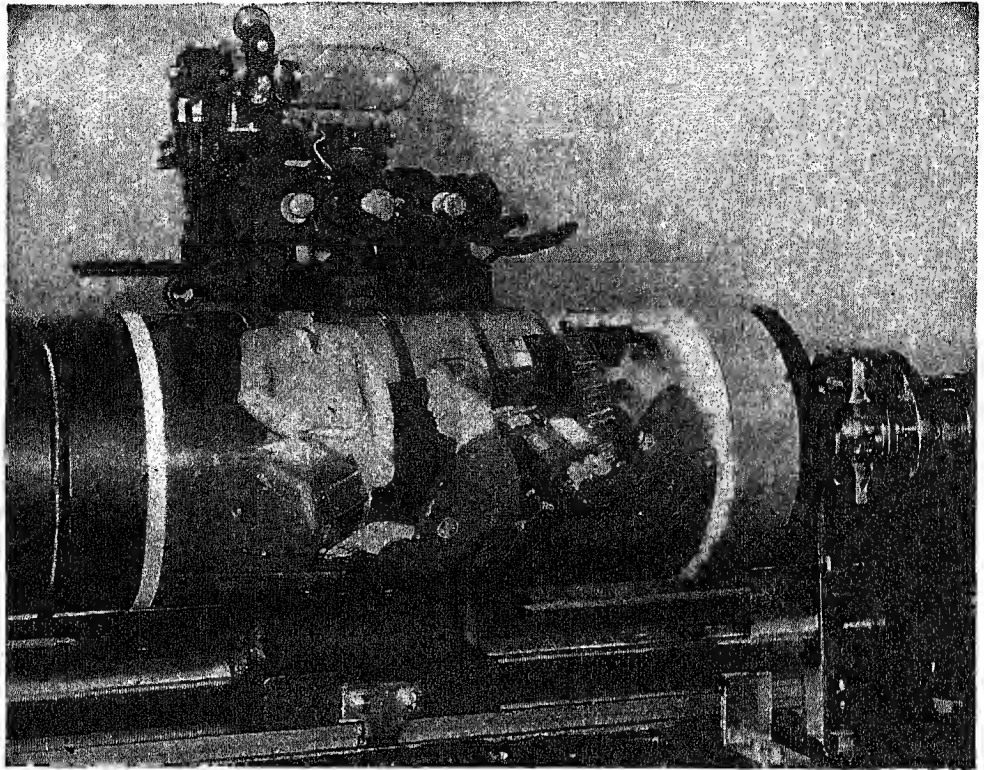


Photo: A. T. & T.

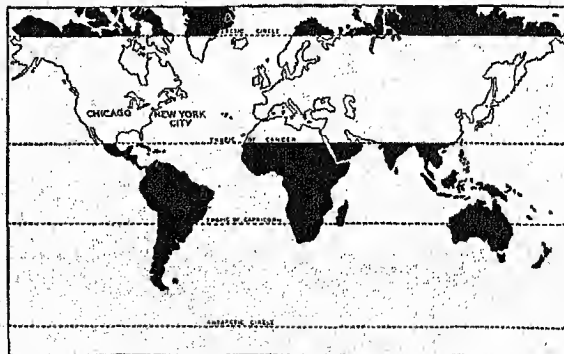
TRANSMITTING PICTURES BY TELEPHOTOGRAPHY

is still able, when it reaches the grid, to vary the potential of the grid in exact duplication of its own variations. The quantity of electrons which passes through the grid and reaches the plate, therefore, varies in accordance with the variations of the current of the "incoming" line. Connected with the plate is a battery which is the source of new and stronger current, and since the variation in the current of electrons reaching the plate controls the variation in the current sent out by the battery, the strengthened current sent out along the line from the repeater varies exactly as the weakened current which reached the repeater.

Supplementing the vacuum tube repeater, and often used by itself to enable telephone conversations over longer distances, the loading coil is used. Contrasted with the repeater, which adds new power to the waning electric current, the loading coil conserves the power of the current. If

its power is better conserved, the current can travel farther before it becomes so weak as to be incapable of activating the diaphragm of the distant receiver.

Three separate telephone conversations may be carried on over two physical telephone circuits by use of a "phantom circuit." Since each physical circuit consists of a pair of



A STRIKING COMPARISON

There are more telephones in two cities (Chicago and New York) in the United States than there are in all the countries of the world outside the north temperate zone.

wires, the third or phantom circuit uses each pair as one wire, the two pairs so used forming a third pair over which conversation may be held just as over each physical pair.

By another method, called the "carrier current system," a number of telephone conversations or telegraph messages or both may be transmitted over a single telephone circuit, in addition to the one conversation transmitted in the usual way. Electric currents of different frequencies, much higher than that used for the normal talking circuit, are transmitted, each carrying the modulations of the voice or of the telegraph signals; hence the term "carrier current." At the terminals of the circuit the high-frequency currents are separated into their respective conversations or signals without interference among the messages.

Radiotelephony. One of the comparatively recent developments in the art of telephony is that of transoceanic telephone service.

Radiotelephone extensions permit telephone connections with practically all the telephones in Western Europe; Egypt and part of South Africa; Australia; India, French Indo-China, Thailand, and the Netherlands Indies; nearly all Central and South America; Bermuda, Hawaii, Puerto Rico, the Bahamas, the Canary Islands; the Philippines, Japan, and Alaska, thus putting 93 per cent of the world's instruments within reach of the United States telephone user. There is also ship-to-shore service between many ocean liners and the mainland; in addition, there are radiotelephone stations at many United States ports to serve the harbor and coastwise shipping and also pleasure craft.

The radiotelephone transmitting and receiving equipment in this country is operated by the American Telephone and Telegraph Company. One long-wave transmitter to Europe is located at Rocky Point, N. Y., and the corresponding receiver is at Houlton, Me. There are short-wave transmitters and receivers in New Jersey, for service to Europe, to Bermuda,

to South America, and to ships at sea. Service to Hawaii, the Philippines, Japan and Java is maintained through radiotelephone stations in California, and in Florida are stations for service to several countries in the vicinity of the Caribbean Sea.

Telephotography. By the use of the photoelectric cell, pictures may now be flashed from city to city over specially equipped circuits in a matter of minutes. The equipment (developed by the Bell Telephone Laboratories), consists of two cylinders, one at the sending and the other at the receiving station, rotating at exactly the same speed. A picture is wrapped around the sending cylinder. A fine pencil of pulsating light (0.01 inch square), moving axially along this cylinder, scans the picture as it rotates. The picture reflects the beam onto a photoelectric cell. This cell emits a current varying in length according to the intensity of the reflected light, which changes with the variations in the tones or shades of the picture. Amplified enormously, this current is transmitted by wire to receiving stations.

On the cylinder in the receiving station is a photographic film (or paper), rotating at exactly the same speed as the sending

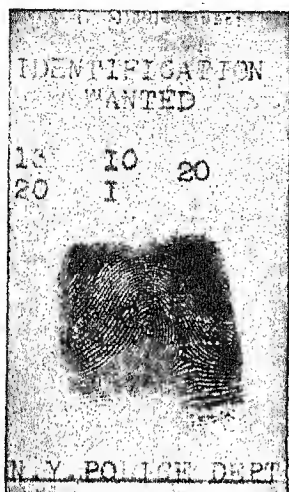
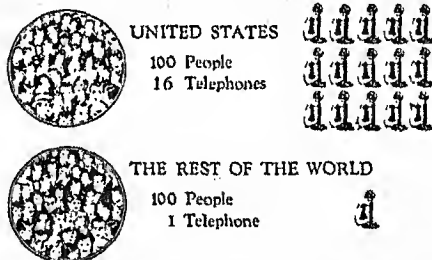


Photo: A. T. & T.

FINGER-PRINT RECORD

Everything which appears in the illustration was telephoned from New York to Chicago.

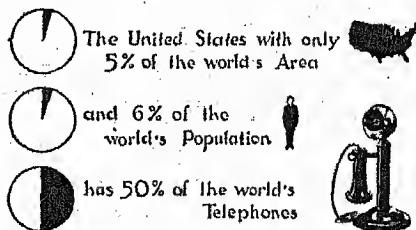
U.S. Far Ahead in Telephone Facilities



THE WORLD'S TELEPHONES

According to recent statistics, the United States has about one half the telephones in use throughout the world.

THE U.S. HAS 8 TIMES ITS SHARE OF THE WORLD'S TELEPHONES



THE GROWTH OF THE INDUSTRY IN THE UNITED STATES

cylinder. A pencil of light, moving forward at the same speed as the beam in the sending set plays upon this film through a "valve" whose opening is varied by the intensity of the current received from the photoelectric cell. The apparatus handles a picture eleven by seventeen inches. By means of this equipment news pictures are exchanged between cities which are widely scattered over the entire United States.

The Use of the Telephone. Nowhere else is the use of the telephone so widespread as in the United States. Each man, woman, and child averages about 220 telephone calls. More than 1,000 telephone calls are completed per second. Abroad, telephone facilities are available in the large cities with more than 50,000 population but the smaller cities and rural areas have a small per cent of the country's telephones. Germany reports only about three

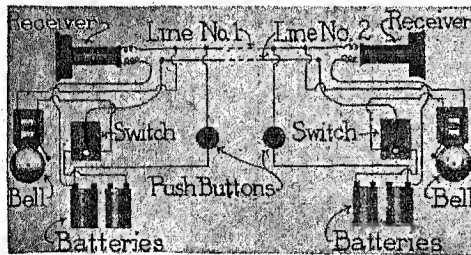
telephones for every 100 people in the smaller communities and Great Britain only about five. In the United States there are about eleven telephones for every 100 people in small towns and rural areas.

The world's total mileage of telephone wire exceeds 160,000,000; of this total, the United States has 92,000,000 miles. There are about 20,000,000 telephones in the United States. Europe has about 15,000,000, while the remaining 5,250,000 telephones of the world are distributed between Asia, Africa, Oceania, South America, and that part of North America outside of the United States. In Canada there are 1,266,228 telephones, about $3\frac{1}{2}$ per cent of the total telephones in the world. In relation to population, Canada has 11.48 telephones for each 100 of its inhabitants, a development second only to that of the telephone in the United States.

How to Make a Simple Telephone

Two boys can easily make and set up between their homes a good, working telephone line. It will be necessary to have two telephone receivers, which will serve also as transmitters. The receivers may be purchased in an electrical shop, or they may be made as follows: Cut off a piece of curtain pole about one and one-eighth inches in diameter and three and one-half inches long; or, if a wood-turning lathe is at hand, turn out such a piece. Bore a hole three-eighths of an inch in diameter, lengthwise through the center. Bore two holes one-sixteenth inch in diameter, lengthwise through

an inch in diameter in the center. It must have a thin rim or collar, to separate it from the disc. The disc is made of thin, soft iron, such as photographers use for tintypes, and this must be of the thinnest variety. The magnet is made of a piece of steel rod three-eighths of an inch in diameter, and four and one-quarter inches long. If soft steel is used, it can be hardened by heating it red hot and then plunging it into cold water. The steel rod can be magnetized at the nearest electric-light plant, where the dynamo-tender will, no doubt, be willing to hold it for a few minutes against the field magnet of one of the large dynamos. The parts described, when put together, appear as in the illustration shown at the bottom of page 7072 in this article, which represents the receiver as if it were sawed through lengthwise from end to end. In addition to the two receivers, two electric bells, two switches, two push buttons, and four dry cells are needed. These are connected as in the illustration. Care must be taken to connect the dry cells in series; otherwise, one battery will neutralize the effect of the other. The push buttons are for the purpose of ringing the bells, and the switches for making the proper connections for ringing and talking. It will be well to set up both sets in one room and to experiment with the switches and push buttons, to learn how to make the proper connections, before setting up the line between two houses, as corrections are then more easily made.



ARRANGEMENT OF TELEPHONE LINES

Two boys can construct a simple line with two telephones, making connections as shown above.

the rod by the side of the first hole. The last two holes are for the wires to pass through.

A round wooden box about two and one-half inches in diameter is needed; a wooden pill box can be used, or one can be turned on the lathe. If a pill box is used, two wooden lugs must be glued to the bottom of the box, to hold the screws by which the cap is fastened. If the box is lathe-turned, the sides can be made thick enough for the screws. The cap is made of thin wood, hard rubber, or hard fiber, cut to fit the box, and having a hole about half

Related Subjects. The reader is referred in these volumes to the following articles:

Bell, Alexander Graham	Telegraph
Communication	Teletype
Radio Communication	Television

TELEPHONE, WIRELESS. See RADIO COMMUNICATION.

TELEPHOTO, tel' e fo toh. See PHOTOGRAPHY (By Telephone and Radio).

TELESCOPE, a magnifying device used for viewing distant objects. It was the telescope that gave to man an idea of the vastness of the universe and of the smallness of his own world, floating like a grain of sand in the immensity of space. It overthrew existing notions of man's destiny and importance in the scheme of things, and forced him to shape a new philosophy. In fact, the revolution wrought by the telescope was so great that it can hardly be exaggerated.

The transforming power of the telescope on man's thinking was shown from the very invention of the instrument, in 1608. Roger Bacon may have had a telescope several centuries before, but the credit of invention has been assigned to various persons, and Hans, or Johann, Lipperhey, a Dutch optician, is most commonly accorded the honor. It is said that he conceived the idea accidentally, while looking through some old spectacle lenses. When two lenses were held in a certain position, the weathercock on a distant steeple appeared near to the eye looking through them. Galileo, the Italian astronomer, was the first to bring out a practical instrument. He heard of Lipperhey's invention, and made one of his own the next year. Galileo's first telescope was a crude affair, and the best one he was

swarm with countless glittering points of light. The naked eye can see between 2,000 and 3,000 of these stars or suns; the telescope reveals millions of them. Stars that seem single to the unaided vision are split up by the telescope into two or three stars, turning about one another in space. The Milky Way, which makes but a luminous patch across the sky, is dissolved into countless multitudes of distinct stars. Among the seven chief stars of the Pleiades, the telescope shows a star cluster in which 2,326 stars have been counted.



TWO-HUNDRED-INCH TELESCOPE MIRROR

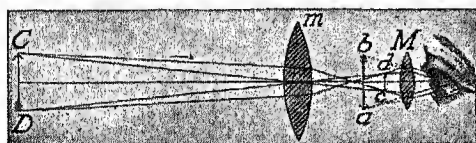
The glass disk poured at Corning, N. Y. in 1934 is nearly seventeen feet in diameter, twenty-seven inches thick, and weighs twenty tons. The giant size of the world's greatest "eye" can be judged by the comparative size of the men. Supporting the disk is the great mold mounted on the carriage of the sixty-ton locomotive hoist which moved it from the annealing kiln.

Structure. The essential parts of a telescope are an *objective* (also called *object glass* and *object lens*) for the formation of an image of the object under observation, and an *eyepiece* for magnifying the image. These parts are set in a tube, so constructed that the observer can lengthen or shorten the distance between them. Astronomical telescopes are of two types, refracting and reflecting. In refractors the objective is a large convex lens of long focus, and the eyepiece a convex lens

of short focus. In reflectors the object glass is a concave mirror which reflects the rays of light to a focus.

The accompanying diagram shows the principle of the astronomical refractor. The object viewed is marked *CD*; *m* is the objective, and it forms an inverted image *cd*. This is viewed through the eyepiece *M*, which produces a magnified image, *ab*, of the first image. The first image, *cd*, is as much smaller than the magnified image, *ab*, as the focal distance of the eyepiece is smaller than that of the objective. The objective has to be made large, in order to collect enough light to permit magnifying of the image without too much loss of distinctness.

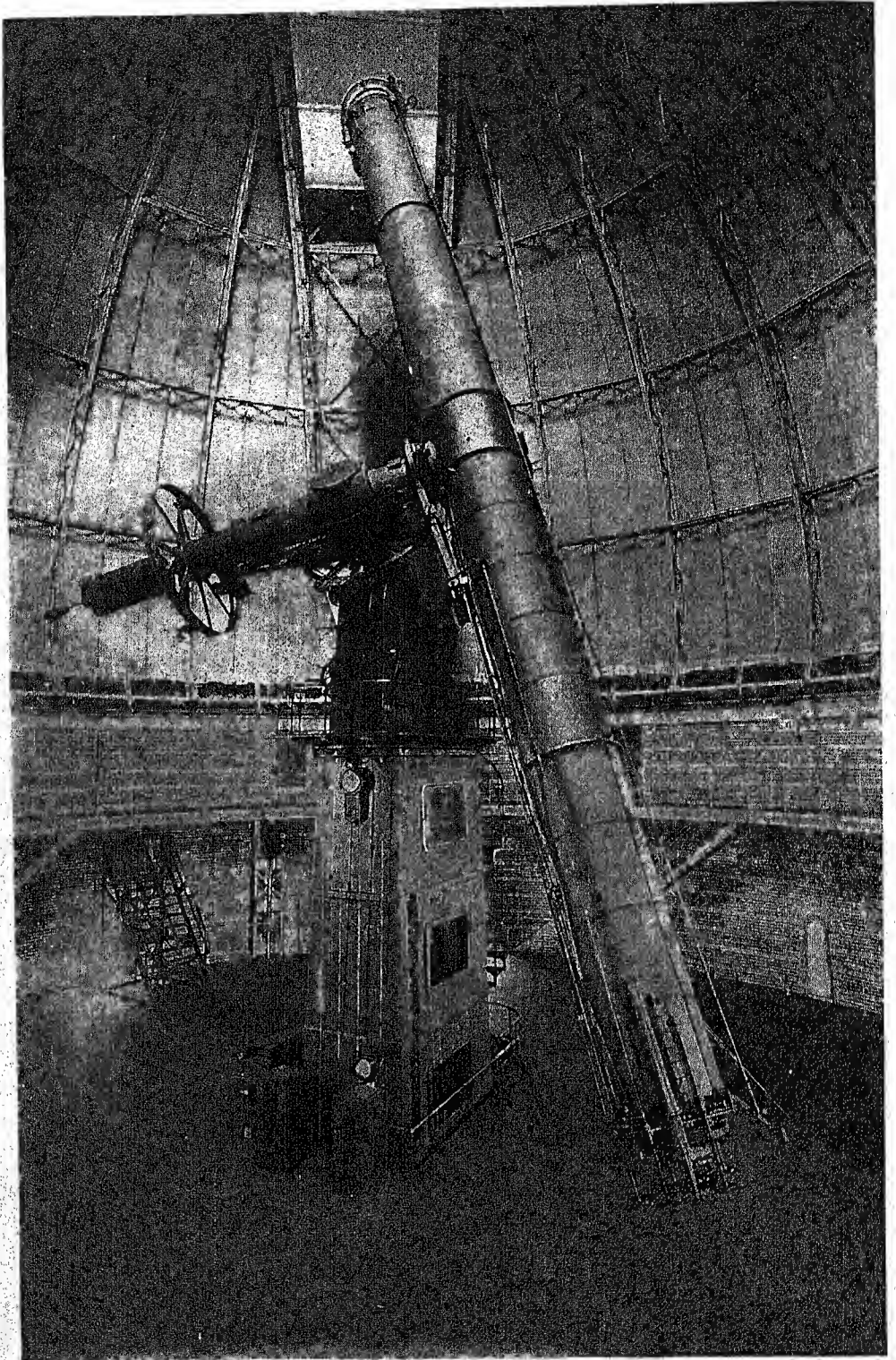
Terrestrial telescopes, which are constructed for viewing objects on the earth, have two double-convex lenses between the eyepiece and the objective, and, as the rays diverge from the inverted image, they cross and form an erect, magnified image. The inversion of the image in astronomical instruments does not interfere with the accuracy of observations.



PRINCIPLE OF THE REFRACTING TELESCOPE
Explanation appears in text.

able to devise before his death magnified but thirty-three times. Nevertheless, he was able to discern four of the satellites of Jupiter, and to discover unknown characteristics of the sun, the moon, and other heavenly bodies.

Under the action of a powerful lens, the summer heavens are transformed, and they



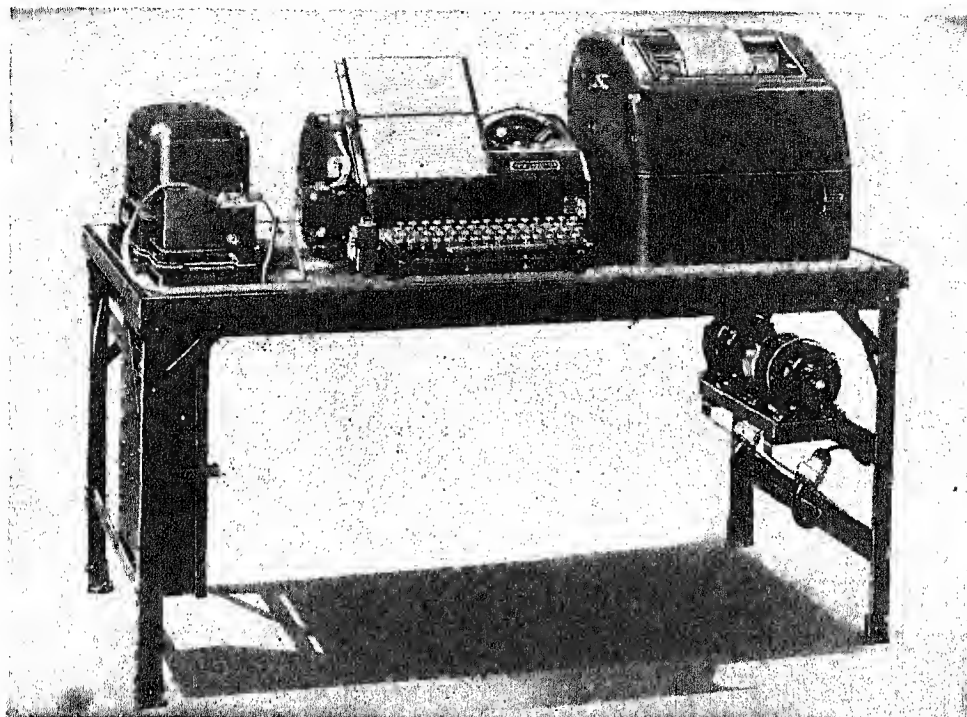


Photo: Teletype Corp.

TAPE PERFORATOR

Monitor Teletype at right. Tape transmitter at left.

Great Modern Telescopes. The largest refracting telescope in the world is that in the Yerkes Observatory, on the north shore of Lake Geneva, Wisconsin. It is the property of the University of Chicago. The object lens has an aperture of forty inches and weighs about 760 pounds. The tube is sixty-two feet in length, has a weight of six tons, and is mounted upon a massive cast-iron column, which rests upon a solid concrete foundation. Clockwork located in an upper section of the column drives the mechanism. The apparatus occupies a dome ninety feet in diameter, which has a rising floor seventy-five feet across. This floor moves through a range of twenty-three feet between two balconies, and is close to the lowest point when the observer is viewing a star near the zenith. Second only to the Yerkes refractor is the thirty-six-inch telescope of the Lick Observatory at Mount Hamilton, Calif.

The great reflecting telescope of Lord Rosse, at Birr Castle, in Ireland, was for a long time the largest of its kind in the world. Since 1914 it has been a possession of the South Kensington Museum of Science. The reflecting mirror of this instrument is six feet across, but the telescope is surpassed in size by those of Mount Wilson Solar Observatory (8 feet 4 inches) and the Dominion Observatory, near Victoria, B. C.

(6 feet 1 inch). Other notable reflectors are those at Harvard University, Melbourne, and Paris. The telescope at Harvard, which has a mirror five feet across, has been used with remarkable success in photographing the stars.

In 1934, a 200-inch reflecting mirror was cast at Corning, N. Y. (see page 7081), and was shipped to California in 1936 for later installation in a huge telescope, designed for the California Institute of Technology and housed on Mount Palomar in southern California. It will increase the volume of space to be explored visually twenty-seven times more than that now within the range of the 100-inch telescope on Mount Wilson. In 1939, was dedicated the eighty-two-inch telescope of McDonald Observatory, at Mount Locke, Tex. The observatory is 6,828 feet above sea level.

Related Subjects. The reader is referred to:

Astronomy	Light	Observatory
Lens	Milky Way	Star

TELETYPE. The Teletype makes possible the transmission of typewritten messages over a distance. The instrument resembles an ordinary typewriter. As each key is struck at the sending machine, electrical impulses actuate the type bars on the receiving machine or machines to which the sending instrument is connected by wire. Thus, as the message

SHIFT	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000
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Photo: Teletype Corp.

TAPE PERFORATOR ALPHABET CODE

The Teletypesetter system also lends itself readily to operation over telegraph wires. By the use of Teletype printing telegraph apparatus, it is possible for Teletypesetter tape to be prepared at one point and transmitted over wires any distance to be reproduced at any number of points, where the reproduced tapes can then be used to operate typesetting machines. To transmit the tape by this method, it is run through a tape transmitter, which feeds the tape step by step and translates the code combinations, represented by the punched holes in the tape, into combinations of electrical impulses. These impulses travel over the wires and operate at the receiving station repeaters which reproduce tape identical with that which has been fed into the transmitter at the sending station. If desired, a Teletype at the receiving station can be operated simultaneously with the reproduction of the perforated tape, and a typewritten copy of the story produced.

If, now, the light reflected from the subject at each instant during scanning falls on a light-



PIONEERS IN THE FIELD OF TELEVISION

From left to right: C. Francis Jenkins, John L. Baird, E. F. W. Alexanderson, and Vladimir K. Zworykin.

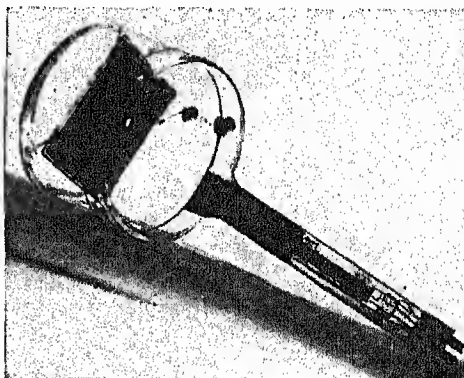
sensitive cell, there will be set up in that cell a current of electricity that corresponds in intensity to the strength of the reflected light. Thus there will be a current fluctuating exactly as the light reflected from the subject fluctuates in accord with the lightness or darkness of the areas on which the scanning beam falls. If this fluctuating current is now used to operate a neon lamp or other suitable light source, the light emitted will be in exact proportion to that reflected from the subject being televised. If a disk similar to that at the transmitter, and revolving in synchronization with it, is placed between the neon lamp and the eye of the observer, there will be seen a reproduction of the subject.

While Nipkow was able to work out the essentials of television, it was not until suitable equipment was available for electrical amplification that television even approached a stage of practicability. With the advent of the vacuum tube amplifier, it became possible to build up tiny electrical currents to a point where they could be transmitted to a distance and made to give fairly good images. In 1925, C. Francis Jenkins in the United States, and John L. Baird in England, demonstrated television transmission and reception, using scanning disks, modern vacuum tube amplifiers, efficient photoelectric cells, and light sources at the receiver, that made possible images that were entirely recognizable. At about the same time, E. F. W. Alexanderson of the General Electric Company was experimenting along the same lines. These men and other scientists worked with various types of scanning disks, some of them using mirrors and lenses in attempts to increase the amount of light available for reproduction at the receiver and to improve the detail of the image.

The limitations of mechanical scanning were thoroughly understood. Large disks, or disks with complicated and expensive lenses and mirrors, were necessary in order to reproduce images of a size that could be considered satisfactory for home use. The disk at the receiver must be kept in exact synchronism

with the disk at the transmitter, otherwise there would be a distorted image or no image at all. The disk at the receiver limited the amount of light reaching the eye of the observer and hence the brilliance of the received picture.

Thus it became necessary to turn from mechanical scanning methods to other systems that did not have these inherent drawbacks. In 1933 the Radio Corporation of America announced a television system that involved the use of an electrical scanning method



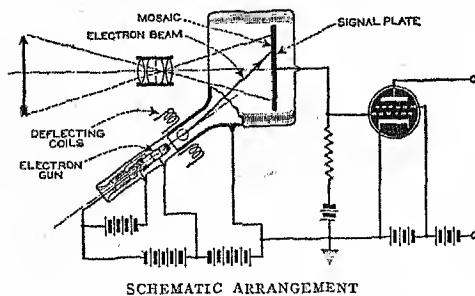
THE ICONOSCOPE

Heart of the television transmitter, the iconoscope transforms light impulses into electrical impulses.

developed by Vladimir K. Zworykin, in which there are no moving parts. Experimental work along similar lines has been done by an independent experimenter, Philo T. Farnsworth, as well as by others.

Two vacuum tubes of special design and function are the essential parts of the Zworykin system. One of them, at the transmitter, operates in the television camera or pickup, while the other, in the receiver, renders the image visible. The transmitting tube, known as the *iconoscope*, is shown in one of the accompanying drawings. Within it, so placed that the scene to be televised can be focused on it through a lens system, is a square photo-sensitive mosaic. Actually, this mosaic is a

metal plate on the face of which, but insulated from it, are millions of tiny photosensitive elements. In the neck of the tube is located an "electron gun" which, when suitably



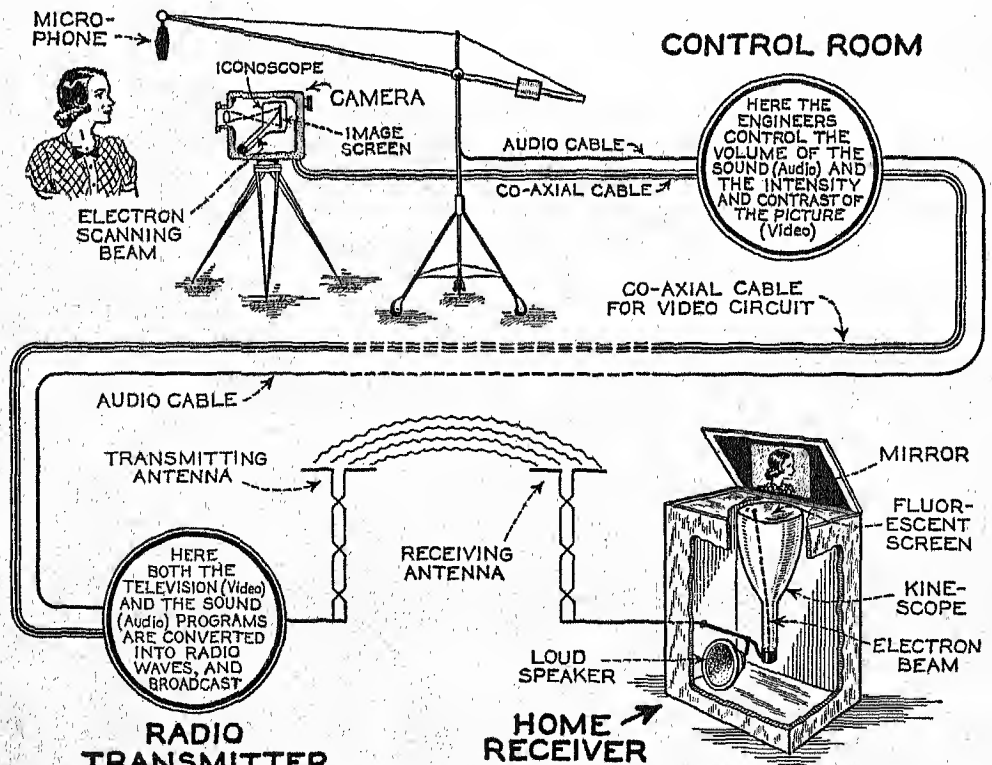
The iconoscope tube in a television camera.

operated, sends out a narrow beam of electrons that strikes the mosaic. This beam, however, passes through the influence of a set of deflecting coils which control its direction in two planes. By means of these coils, the beam of electrons can be made to play over the mosaic in a constant series of parallel lines.

The myriad of elements on the face of the mosaic act as individual terminals of a like

number of photoelectric cells, the second terminal for each element being common to all and consisting of a silvered area on the inside of the glass bulb. When these elements are acted on by light, as when a scene is focused on the mosaic, each one of them builds up a charge that is in exact proportion to the amount of light reaching it. This charge is stored until the beam of electrons from the gun sweeps across, discharging the cells as it passes and causing a fluctuating current to be set up in the circuit of the iconoscope. As in the case of the scanning disk, this current is virtually an electrical representation of the light elements of the scene being televised.

After the current from the iconoscope passes through stages of amplification, is transmitted, and finally reaches the television receiver, it is employed to reproduce a picture on the flat end of another vacuum tube. Like the iconoscope, this receiving tube, known as the *kinescope*, has an electron gun at one end of it. Instead of a mosaic, however, it has at the other end a fluorescent screen on which the picture appears. This screen is of a material that absorbs electrical energy and emits light as a result. Thus, when the beam from the electron gun, fluctuating in accord with the



HOW TELEVISION IMAGES ARE SENT FROM THE CAMERA TO THE RECEIVER



A TELEVISION STATION ON WHEELS

The two trucks contain complete apparatus for picture pickup and transmission with accompanying sound. On the roof of one of the trucks are positions for television cameras and microphones. Atop the other is an antenna for relaying the signals to the main transmitter where they are broadcast.

received current and hence with the light reaching the iconoscope at the transmitter, sweeps back and forth over the screen in the kinescope, it literally paints a picture with light. The beam in the receiving tube is kept in constant step or synchronization with the beam in the transmitting tube so that at any one instant the receiving beam is of an intensity governed by the charge being released from the photosensitive units on the mosaic.

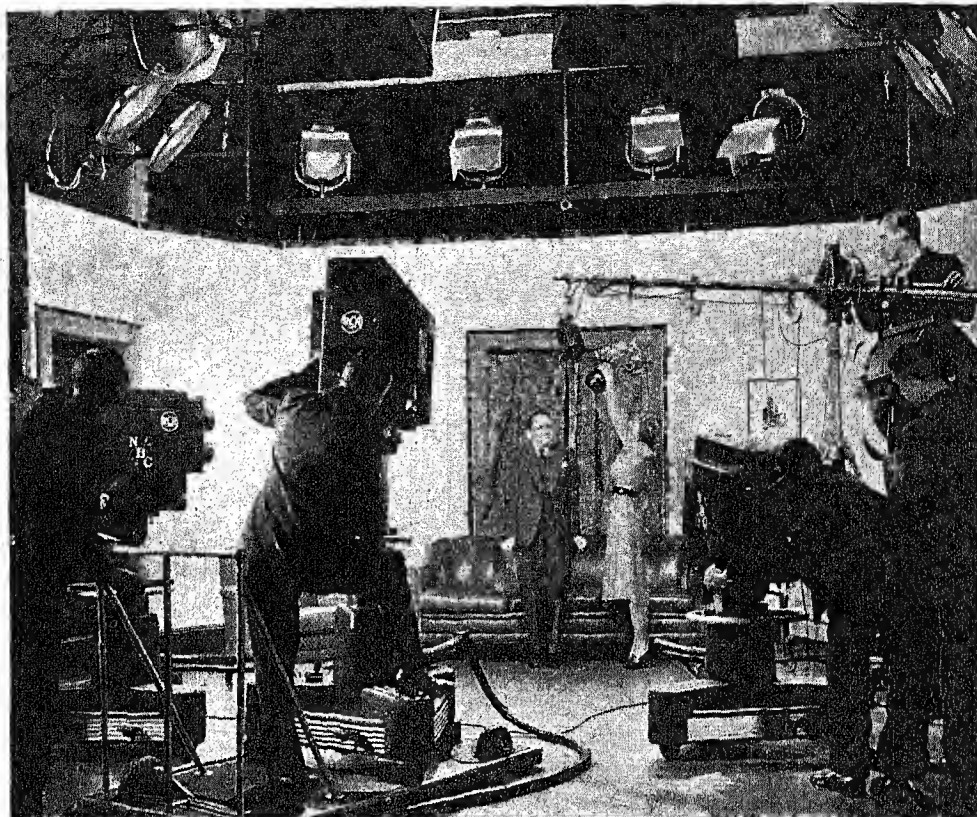
Transmission. Solving the problems of picture pickup and reproduction does not immediately clear the way for television entertainment in the home. Because of the electrical characteristics of the currents which carry the translated television images, it becomes necessary to provide a transmission method or medium that will make possible faithful reproduction at the receiver. This requires transmission frequencies up in the millions of cycles and hence radio wave bands many times wider than those used for sound broadcast transmission. It has become necessary, therefore, to confine radio television transmission to the extremely short waves (high frequencies) where there is room for the broad bands required.

With networks, however, there arises another difficulty. The high transmission frequencies required for television cannot be carried efficiently on ordinary telephone wires such as are

used to connect the transmitters of a sound broadcasting network. Therefore there has been developed a special cable for this purpose, known as the coaxial cable and consisting of two conductors, one within the other and separated by an air space.

Standards. Early experiments with scanning disks were made with little or no thought of standardization. Thus, some workers used forty-eight holes in their disk spirals, and others sixty holes. When electronic scanning, as developed by Zworykin, Farnsworth, and others, showed promise of success, the number of lines in the scanning system was still low and the reproduced pictures were correspondingly poor in detail. As the work progressed, the number of scanning lines was increased until, in 1936, a standard of 441 lines was settled upon. It was necessary to reach some such decision so that, when television came into general use, a single receiver could be used to reproduce the pictures from any transmitter within its radius, and would not be limited only to the one that happened to be using the scanning system for which the receiver was designed.

Pictures received with the 441 line standard scanning are reproduced in fine detail, rivaling in this factor and in strength of illumination a good quality home motion picture. Features of actors can be distinguished, even when very



A TYPICAL SCENE IN A TELEVISION STUDIO

The microphone on its movable boom picks up the sound. The television cameras, arranged to show the scene from various angles, pick up the image of the scene.

small; there is little or no flicker of the reproduced image; and no more eyestrain is experienced than when watching moving pictures.

Broadcasting. Television transmitters have been in more or less consistent operation abroad, especially in England and on the Continent, since 1930. Television was released to the public abroad long before it was offered as a regular service in the United States. Here, however, laboratory experimental work proceeded steadily, the general feeling of technicians and business men being that a regular television service should not be made available until many of the problems had been solved and the service made comparable in quality with the long-established sound broadcasting.

In the meantime, field tests were being conducted in connection with the laboratory work, toward the end that a maximum amount of information should be collected regarding the reception of television signals in different localities, the behavior of television signals under varying conditions of weather and static, and other effects that would have a bearing on the success of scheduled programs.

Also, workers other than laboratory technicians were studying other phases that would ultimately become intimate parts of an integrated television system. Stage settings, make-up for actors, types of entertainment that would hold the greatest interest when telecast, studio design—all these and many related subjects have been carefully surveyed. During all this preparatory work, occasional demonstrations were staged to show the progress that had been made. The test programs were continued and special parts were made available for amateur experimenters to build receivers.

Then early in 1938 came the fine demonstration, by RCA, of 441-line television mentioned above. Here indeed was a progress report that set a high standard of transmission and reception. Later came another demonstration, even better in that it was a more finished performance. During the summer of 1938 the National Broadcasting Company opened at their New York headquarters a "television tour" where the public could view an historical exhibit of television milestones, see television transmission and reception on a

working scale, and be televised themselves.

In April, 1939, RCA released television receivers of advanced design for purchase by the public, and NBC went on the air with regular television programs, giving a scheduled service better than anything that had been offered in the past, and at least a part of the



A HOME TELEVISION RECEIVER

The reproduced image is seen in the mirror in the lid of the cabinet. Separate controls are provided for the sound and sight signals.

eastern section of the United States was supplied with home television service. By 1940, a number of stations were "telecasting," and much work had been done toward perfecting color television. Federal authorization of commercial programs became effective July 1, 1941.

A combination of television and telephone service was demonstrated in New York in 1930, whereby two people holding a telephone conversation could see images of each other on small screens. A similar service was started in Germany in 1936, over a line between Berlin and Leipzig. Later this line was extended to Nuremberg, and in 1938 Nuremberg was linked with Munich by the same system.

News by television was demonstrated in 1937 by William Hoyt Peek, a pioneer experimenter in mechanical scanning. In this system a moving line of type is scanned at the transmitter; at the receiver the type image is reproduced and projected on a screen.

Motion pictures have been successfully used in television transmissions. The film is scanned at the transmitter and reproduced at the receiver. The first public showing of a program

received on a large-sized screen was exhibited in a New York theater on May 9, 1941. A.P.P.

TELEVOX is the name assigned to a mechanoelectric "man" which can perform much of the drudgery of the workaday world, when ordered to do so by human agency, or when pre-set to carry through with a desired sequence of operations. The first televox was designed by R. J. Wensley, an engineer of the Westinghouse Electric & Manufacturing Company. While demonstration models of televox have been constructed in the form of human beings, most of those which are used in everyday industry are enclosed in boxes. Those in the form of a man are usually called *robots*.

Essentially, all forms of televox owe their existence and utility to developments in the electrical arts. By means of relays, telephone equipment, and mechanical linkages, they "read" and record or transmit to a distant point such items as the indications of meters, the height of water in reservoirs, and the temperatures of transformers and other devices. Televox automatons are now regularly in control of manless power plants and water-supply stations.



TELEVOX

Robot. This is a name, from the Czech word for *work* (*robot*), applied to a machine that seems as clever as a human being, or to a man whose work is so mechanical that it requires a minimum of intelligence. The term was popularized by a play called *R.U.R.* (*Rossum's Universal Robots*), in which the chief characters were mechanical men.

In times past, various automatons were constructed to perform feats such as playing musical instruments, turning a crank, or playing a game of chess. Most of these were toys. Modern robots, however, actually take the place of human workers. They are used to regulate the operation of machines, to steer and stabilize ships, to indicate the flow of the tides, and to control the temperature and humidity in many industrial processes. Recent discoveries in the field of electricity have enabled the mechanical man to see, hear, feel, smell, and talk. In 1939 was announced the first device that actually creates human speech, building it up from twenty-two fundamental sounds. E.U.G.

TELL, THE. See ALGERIA.

TELL, WILHELM [WILLIAM], a legendary hero of Switzerland, whose story, though per-

haps not historically accurate, typifies the spirit that gave the land its freedom. According to the legend, Tell was a peasant of Uri, one of the Forest cantons. In 1307, when the country lay restive under the oppressive rule of the Austrians, he appeared one day in the market place of Altdorf. Here, on top of a pole, the Austrian bailiff Gessler had set up a cap, to which he commanded all Swiss to do homage. Tell refused to humble himself, and was told that he would be put to death unless he could save himself by shooting an apple from the head of his little son. This harrowing feat he accomplished, but when he confessed that a second arrow in his quiver was intended for the heart of Gessler, had the first not hit the mark but had killed his son, he was seized and placed in chains.

While he was being carried across a lake in the tyrant's boat, a great storm arose. In fear of his life, Gessler ordered the prisoner unbound, that he might help guide the boat. Tell, when his chains were loosed, sprang ashore, and soon sent an arrow into the heart of his persecutor. The story then connects itself with the revolt of the Forest cantons, in which Tell is given a conspicuous part. This popular tale is the basis of Schiller's drama *Wilhelm Tell*, and of an opera by Rossini.

TELLEGEN, LOU (1881-1934), an actor of romantic rôles. See FARRAR, GERALDINE.

TELL EL-OHEMER, modern name of the ancient city of Kish. See DELUGE; ARCHAEOLOGY.

TELLURIUM. See CHEMISTRY (The Elements).

TELPOS, MOUNT. See URAL MOUNTAINS.

TEMPE, VALE OF. See THESSALY.

TEMPERANCE, a term which signifies moderation in the exercise of the functions and privileges of life. "Let your moderation be known unto all men," is one of the oft-quoted teachings of the Apostle Paul. Moderation in eating and drinking, in the enjoyment of pleasures, in the expression of opinion, in work and in play, is good for all. Society has found it necessary to make many of its laws not for its moderate members, but for those who know no moderation; so it is sometimes necessary

to deny a people a privilege which would be harmless if moderately enjoyed. Restrictive laws in regard to personal conduct would not be necessary if every one were temperate in all his actions.

In the nineteenth century, temperance came to have a special meaning, referring to the use of alcoholic beverages. In fact, it came to mean, not moderation, but *total abstinence*. Nowadays, when the temperance movement is spoken of, one thinks involuntarily of the spread of prohibition.

Related Subjects. In connection with the general subject of temperance, readers may consult the following articles:

Anti-Saloon League
Good Templars
License
Local Option
Prohibition
Prohibition Party
Woman's Christian
Temperance Union



TELL MEMORIAL AT ALTDORF, SWITZERLAND

Historians will never agree upon the question of a real William Tell; but that he lives to-day in the spirit of Swiss love of freedom, the whole world recognizes.

TEMPERATURE. In physics, *temperature* is a term used to describe the state of a body with reference to its ability to communicate heat to other bodies. When two bodies are brought into contact, and one transfers heat to the other, it is evident that the one receiving heat has a lower temperature than the other.

Temperature is measured by the thermometer, an instrument having a graduated scale of degrees between two fixed points, the freezing point and the boiling point. There are in general use two scales, Centigrade (C.) and Fahrenheit (F.), the former having the freezing point at zero (0°) and the latter 32° above zero. The boiling points are, respectively, 100° and 212°. In theory, there is a point at which the vibrations constituting heat cease, and this point (273° below Centigrade zero) is known as the *absolute zero of temperature*. In practice, this point has never been reached, but it is used as a convenient standard in scientific calculations. In physical geography, temperature refers to atmospheric heat in various localities.

The temperature of the human body is normally 98.6° F.; it increases in fever and sunstroke (both of which see).

Earth's Extremes in Temperature. Between the hottest and the coldest temperatures ever officially recorded, there is a variation of 226.8° F.; an unofficial record that is accepted as reliable increases the variation to 234°. The

coldest spot on earth, so far as is officially known, is at the 15,000 foot level on Mount McKinley, Alaska, where, in May, 1932, Albert D. Lindley found the self-registering thermometer left by Hudson Stuck in June, 1913. It showed a reading of 95° below zero. An unofficial record at Verkhoyansk, Siberia, in 1926, gave a temperature of 97.6° below zero. During the two months of summer, this vicinity experiences a temperature of about 80°.

There are some exceedingly hot places in the world. The Italian meteorological station at Azizia, in the semi-desert plain of Jefara, North Africa, registered 136.4° in the shade, on September 13, 1922. Until that record was established, California's similar arid inland plain, Death Valley, held the world's heat record, with a temperature of 134°. This was at Greenland Ranch, on the edge of the Valley.

A.L.F.

Related Subjects. The reader is referred to the following articles:

Centigrade	Heat
Climate	Sunstroke
Death Valley	Thermometer
Fahrenheit, Gabriel D.	Weather Bureau
Fever	

TEMPERING, the process of imparting to metals, principally iron and steel, a required degree of hardness. In industry, the term is now almost exclusively restricted to hardening steel. Numerous methods of tempering are in use, but all depend upon the same principle—heating and cooling the metal. When iron or steel is heated red hot and suddenly cooled in water, it becomes hard and brittle. Cast iron is cooled so rapidly in the molds that it is brittle. On the other hand, if allowed to cool slowly, the iron or steel becomes soft and flexible. Red-hot steel rods, when allowed to cool slowly in the air, can be bent into any desired form, and are easily cut with a file or metal saw. Between these extremes there are many degrees of hardness, each adapting the metal to the special use for which it was designed.

To secure the requisite temper of a fine tool requires skill and experience. To illustrate, in tempering razors, the blade is forged, and when it is red hot, the edge is dipped in water for a moment to the depth of a half inch, then withdrawn, and quickly polished on an emery belt. This part of the blade becomes heated from the thicker part that was not immersed in the water. As the temperature rises, the polished surface changes color. By experience, the workman knows from the color when the required temperature is reached. He then plunges the blade into water. Oil or molten lead are also used for quenching steel, and they cool the metal more slowly, preventing the cracking that sometimes occurs in high-carbon steels when water is used.

The colors which the workman must note in the processes of tempering, and the finished tools of different hardness produced from the various colorings, are as follows:

Pale yellow (about 430° F.); hammer faces, planer tools, engravers' tools.

Straw yellow (about 460° F.); dies, drills, punches, etc.

Brown yellow (about 500° F.); plane irons, gouges, twist drills, and coopers' tools.

Light purple (about 530° F.); surgical instruments, augers, cold chisels.

Dark purple (about 550° F.); axes, springs, saws, screw drivers, and needles.

TEMPEST, *The*, a fantasy by William Shakespeare (which see).

TEMPLARS, KNIGHTS, a military and religious organization founded at Jerusalem in 1119, by eight French knights who bound themselves by vows of obedience, poverty, and chastity, and took as their special work the protection of the Holy Sepulcher and the defense of pilgrims journeying to the sacred spot. The society grew rapidly in numbers, though at first only nobles or knights were admitted. Along with the special privileges granted the order by the Pope and various European rulers, it acquired many rich landholdings. At the height of its power, it is said to have possessed no fewer than 9,000 manors throughout Europe. Secular priests were admitted, to forward the specifically religious purposes, and subordinate members for the menial tasks, while the knights proper gave all their time to fighting.

Much of the history of the Crusades is but a history of the Templars. Their personal bravery was remarkable, and during the long attempt to hold Jerusalem for Christianity, over 20,000 of them met death on the field. The Latin kings of Jerusalem gave them quarters in the palace built on the site of Solomon's Temple; from this fact, the knights took their name. Fighting side by side with them when the struggle with the infidels was fiercest, and opposing them in bitterest rivalry when conditions were less compelling, was the other great military and religious order, the Knights Hospitallars of Saint John (which see).

The kings of Europe, impoverished by the Crusades, looked with envy upon the possessions of the Templars, and decided to gain them for themselves. King Philip IV, of France, and Pope Clement V led this opposition, which, soon after the beginning of the fourteenth century, culminated in the death by torture of many members of the Order, including the Grand Master, Jacques DeMolay, burned at the stake in Paris in 1314. During the next few years, the Order was disbanded in nearly all countries because of continued persecution. To give a semblance of justice, members were charged with various crimes. Much of their property was turned over to the Hospitallars.

Modern Knights Templar. One of the branches of Freemasonry is the order of Knights Templar, and to become a member of this order, one must be a Master Mason and Royal Arch Mason. See MASONRY.

W.M.B.

TEMPLE, a building for religious worship, used from primitive times, when only a cave sheltered the members of the cult and the images of their god or gods. Crude though the early temples were, the altar stones and sacred images evidenced the highest skill and art attained by the people. All through the ages, temples were constructed which represented the height of culture attained by the peoples who built them. Among some sects, the temple was believed to be the home of the deity that was worshiped. The term is also used to designate a shrine; Solomon's Temple, the famous center of worship of the Jews (see below); and the meeting places of several fraternal orders.

Temple of Solomon, a beautiful building designed by David and executed by his son Solomon (which see), was the center of Jewish worship until the destruction of Jerusalem by the Romans. The site, on the hill of Zion, was chosen by David, who also gathered the materials for the structure. The walls, sixty cubits long (a cubit was eighteen inches), twenty wide, and thirty high, were of stone, hewn and polished at the quarries, so that there was no sound of hammer or tool of iron in the building (*I Kings* vi, 7). The whole edifice, inside and out, was covered with costly woods, overlaid with gold. Within were the Holy of Holies, containing the Ark of the Covenant, and the holy place, containing the altar of incense, the table of shewbread, and the golden candlestick. In front was a porch, ten cubits wide, with an imposing pillar on either side of the entrance. Surrounding the building on three sides were corridors and cells, rising three stories in height. The Temple faced the east, and before it stood the brazen altar of burnt offering.

The magnificence of Solomon's Temple, its impressive priesthood, and its costly sacrifices centralized the worship of the people, and other places of worship disappeared. It was destroyed by Nebuchadnezzar, in 586 B.C. Zerubbabel's temple, erected after the Exile, was far less splendid than Solomon's. In it the Holy of Holies was empty, the Ark having been lost at the time of the Captivity. This temple was replaced (20 B.C. to 64 A.D.) by the costly temple of Herod, in which Jesus walked and taught, and which, in its turn, was destroyed by the Romans in A.D. 70, when Titus captured Jerusalem, after a siege.

TEMPLE, TEX. See TEXAS (back of map).

TEMPLE OF DIANA. See DIANA, subhead.

TEMPLE OF SOLOMON. See SOLOMON; TEMPLE, subhead.

TEMPLE UNIVERSITY. See PHILADELPHIA; CONWELL, RUSSELL HERMAN.

TEMPO, a musical term meaning *time*, derived from the Italian, and expressing the rate of movement in which a musical composition is to be played. The degrees of time are divided into two classes—those which suggest the rate of movement, such as *lento* (slow), *adagio* (gentle), *moderato* (moderately), *presto* (quick), etc., and those which represent a quality which may influence the time, such as *vivace* (lively), *animato* (cheerful). See MUSIC (A Course of Lessons).

TEMPORAL BONES, two of the eight bones of the head (which see).

TENACITY, *te nas' ih tih*, a property possessed by all matter. It is the resistance which substances exert to being pulled or torn apart, and depends upon the material, the shape of the body, the temperature, and the length of time the weight is applied. The degree of tenacity a body possesses is its *tensile strength*. Tenacity is measured in terms of the weight necessary to break the body. Hollow bodies have greater relative resistance than have solids. The bones of animals, the quills of bird feathers, bamboo cane, and cornstalks are illustrations. A cable of many wires woven together is much stronger than a solid rod of the same size and material, because the sum of the tenacities of the wires is greater than that of the rod. Among the metals, steel (piano wire) has the greatest tenacity, and lead is among the weakest metals, in this respect. In the making of telegraph and cable wires, suspension bridges, and other structural devices, a knowledge of tensile strength is of primary importance. See MATTER; STRENGTH OF MATERIALS.

A.L.F.

TENANT, one who has temporary use and occupation of lands or buildings belonging to another. The terms and period of time are defined in a written agreement, known as a *lease*, signed by owner and tenant. Tenancy for less than a year may be by oral agreement.

The relation of landlord and tenant had its origin in the feudal system of the Middle Ages, and some of the feudal obligations of both the lessor and lessee still survive in the present laws. Laws vary in different states and countries, but there are certain general provisions which apply in most cases. The landlord must defend his tenant's title; whether the latter may sublease without the consent of the landlord is a matter of agreement. The tenant is usually responsible for repairs made necessary by the misuse of the premises, but specific agreements in regard to repairs are usually included in the lease. If the buildings are rendered untenable by fire, the landlord may terminate the lease; or, if he does not make repairs within thirty days, the lease ceases to be binding.

If the tenant fails to pay the stipulated rent or does not adhere to other terms of the lease, the landlord may terminate the lease and may legally enter the premises, expel the tenant, and remove his goods, but the lease still holds. The lessor also has a lien upon the household goods of the tenant, as security for rent. He may sue for any rent that may be due, by the terms of the lease; the tenant may be responsible under the contract for the attorney's fees and other costs. The heirs, successors, or administrators of both tenant and landlord are bound by the terms of the lease.

A *tenant at will* is one who occupies property for an indefinite period, which may be ended at any time desired, by either landlord or tenant. The latter is entitled to a notice of removal, generally sixty days before the day ending the term of occupancy. If he has growing crops on the rented land, he may enter later and gather them.

A *tenant at sufferance* is one who occupies property without the express consent of the owner, or after his term of possession has expired. He may be ejected, at any time, by the landlord.

Derivation. The word *tenant* is derived from the Latin *teneo*, which means *I hold*.

Related Subjects. The reader is referred to the following articles in these volumes:

Contract Law Lease Real Estate

TEN COMMANDMENTS. See DECA-LOGUE.

TENDER, a term in law relating to payment of debt. See LEGAL TENDER.

TENDERFOOT. See BOY SCOUTS; GIRL SCOUTS.

TENDON OF ACHILLES. See ACHILLES.

TENDONS, *ten' dunz*, OR **SINEWS,** *sin' use*, strong, white, fibrous cords which attach the muscles to the bones. They may be round, or long and flat, and are composed of close, tough, parallel fibers. The tapering end of each muscle merges directly into one end of a tendon, the other end of which is attached to the bone in a distinct groove in the bone substance. At this extremity, too, the tendons are firmly embedded in the periosteum, or protective sheath which encases the bones. It is by means of the tendons that the movements of the muscles are transmitted to the bones. See BONE; ACHILLES, subhead; MUSCLES.

K.A.E.

TENEMENT, a name applied to any house constructed for the occupancy of two or more families, the legal definition as to the number of families varying somewhat in different cities. The term is popularly, though not legally, restricted to quarters occupied by the very poor people of a city. Because of laxity in regard to building regulations, many cities have permitted certain sections to decline into so-called slum districts. Old houses in such districts,

from which the better classes have withdrawn, have been converted into tenements, and new ones have been erected with inadequate regard for the health and safety of the occupants. Large families are crowded into small, dark, ill-smelling rooms, which become centers not only of disease, but of crime.

The movement to provide better housing conditions for the poor started in Europe with the erection of model tenement buildings in London, Vienna, and other large cities. Slum clearance was inaugurated in the United States with the passage of the National Housing Act of 1934. Under this act, in 1937 and 1938, Congress made available to city governments, which agreed to furnish 10 per cent of the building costs, loans totaling \$800,000,000. This program led to the development of such low-rental projects as First Houses in New York City, Williamsburg Houses in Brooklyn, N. Y., and the Ida B. Wells Homes (for Negroes) in Chicago.

Beginning with the New York Tenement House Act of 1901, the various states have enacted legislation against insanitary conditions, fire hazards, inadequate water supply, overcrowding, and the construction of the old-law "railroad" and "dumbbell" tenements that did not provide sufficient light and air for each room. Health boards, sanitary inspectors, building commissions, and similar agencies see that the regulations prescribed by city ordinances are obeyed. See CITY PLANNING; SHELTER (Modern Housing).

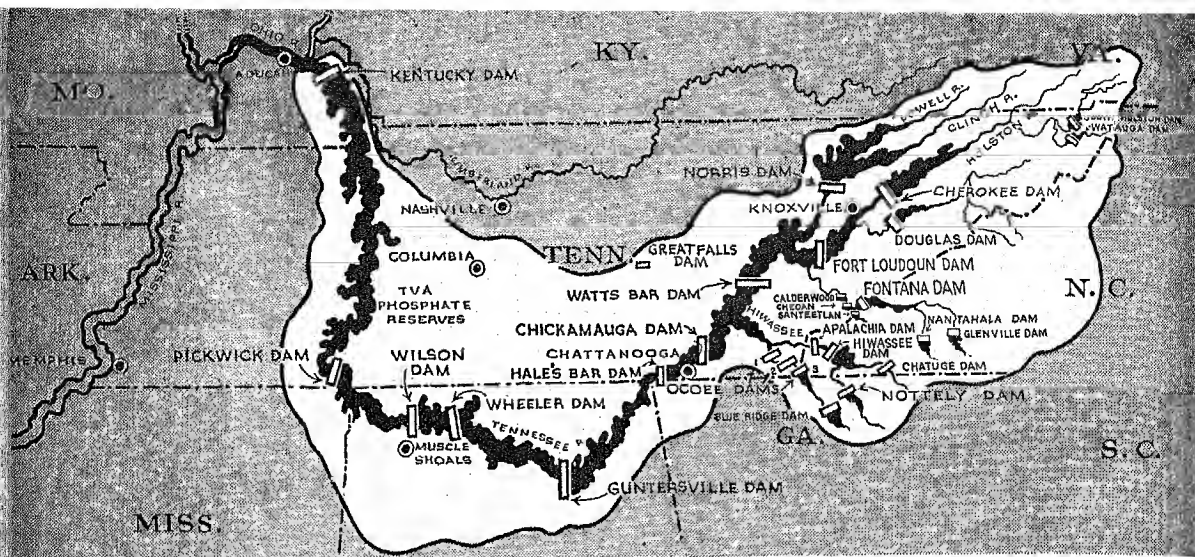
L.L.B.

TENERIFFE, *ten ur if'*, the largest island and also the largest town of the Canary Islands (which see).

TENIERS, *teh nya'*, in English, *ten' yurz*, the family name of two noted Flemish painters, father and son, both of whom excelled in the portrayal of scenes from everyday life.

David Teniers, THE ELDER (1582-1649), was born at Antwerp. He was a pupil of Rubens. His paintings, especially those presenting rustic games and weddings, are noted for their fidelity to nature, their charm of color treatment, and excellence of composition. They include *Peasants Carousing in Front of a Tavern* (Darmstadt Gallery), *A Dutch Kitchen*, now in the Metropolitan Museum, New York, and *Playing at Bowls*, in the National Gallery, London.

David Teniers, THE YOUNGER (1610-1690), who excelled in all the qualities that characterized his father's work, was called "the prince of genre painting." He was born at Antwerp and received his first art instruction from his father. The younger Teniers rose quickly in popular favor, and won the patronage of leading noblemen of his country. In 1651 he took up his residence at Brussels as court painter; here he remained for the rest of his life. Few artists equaled him in the charm with which he depicted open-air life. Among his canvases are *A Merry Repast* (Berlin Museum), *Peasants' Dance*, (Pinakothek, Munich), *The Barber Shop* (in Cassel), and *Marriage Festival*, a possession of the Metropolitan Museum. He founded the Academy in the city of Brussels.



TENNESSEE THE BIG BEND STATE

TENNESSEE, *ten eh see'*, has long been known as **THE VOLUNTEER STATE**, because in every war since the Revolution it has supplied two or three times as many volunteers as were called for by the Federal Government. It also is called **THE BIG BEND STATE**, after the deep southward sweep of the Tennessee River, along which mighty dams have been built to generate electric power and to control floods.

The word Tennessee is derived from an Indian name whose origin and meaning are unknown. Probably the chief village of the Cherokee Indians, called Tannassie or Tanasie, gave its name to the river and then to the whole territory through which the river flows. The name originally was used by Henry Timberlake, a young British officer who visited the Cherokee tribe in 1761.

From the lofty peaks of eastern Tennessee to the western bottomlands along the Mississippi, the land has influenced deeply the character of the people. No inhabitant of the state is ever just a Tennessean; he is an East Tennessean, a Middle Tennessean, or a West Tennessean. The marked differences between the ways of life of these three groups are recognized in the laws of the state as well as in the customs of the people. For example, the Tennessee appellate court is divided into East, West, and Middle divisions.

The East Tennessean is the sturdy, independent uplander, whose life is centered about his small farm in the blue-tinged mountains. His love for home is great, and he disdains to travel, characterizing those who stray to other lands as "journey proud." He is the descendant of those first settlers who, cut off by mountains from the organized colonies of the eastern coast, set up the first independent government of white Americans in 1772.

The Middle Tennessean is the plainsman, fiercely loyal to the political principles of Andrew Jackson (which see). On his broad bluegrass acres, he has developed the famous

easy-gaited Tennessec walking horse. He takes pride, too, in his sleek beef and dairy cattle and perfectly paired mule teams. This region has been famous since 1865 for purebred Jersey cows, shipped to all parts of North America.

The West Tennessean is the soft-spoken plantation dweller, typical of the Deep South. His life is influenced by the broad Mississippi that flows by his cotton fields. Here the Negroes sing as they pick cotton, load the river boats, and, in spring floodtime, bolster the levees with sandbags.

Tennessee has contributed greatly to the building of the United States. It was the home of Daniel Boone and Davy Crockett, hardy woodsmen who blazed the trails for settlers going west. Here, too, lived such famous frontiersmen as Andrew Jackson who, though he became President of the United States, was linked so closely to the political life of Tennessee that his career and the history of the state were virtually the same for a generation. Among the great political leaders were Sam Houston, governor of Tennessee and founder of the state of Texas; and President Andrew Johnson who, as governor, established the first tax-supported schools for Tennesseans.

Tennessee was the last state to secede from the Union in 1861 and the first to be readmitted after the War between the States had ended. The dauntless spirit of its people carried Tennessee through the hard days of Reconstruction (which see) into an expanding agricultural and industrial world, in which it has won a leading place.

To markets throughout the nation go immense crops of Tennessee cotton, tobacco, strawberries, potatoes, peas, and peanuts. Tennessee is second only to Florida in the output of phosphate rock, and it ranks high in the production of chemicals, rayon, and aluminum. Marble quarried in the state is famed for its superior quality. It has been used to build the state Capitols of Tennessee, South



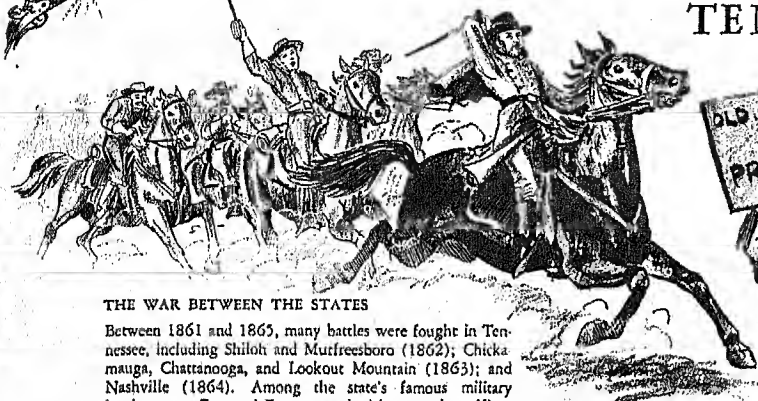
WATAUGA ASSOCIATION FORMED

The first permanent settlements were made in 1769, 1771, and 1772, by a company of colonists from Virginia and North Carolina who settled along the Watauga River. Under the leadership of John Sevier and James Robertson, they drew up the first written constitution adopted west of the Allegheny Mountains.

FOUNDING A NEW STATE

In 1784, when the North Carolina legislature offered what is now Tennessee to the United States without the consent of the settlers, the pioneers set up the separate state of Franklin with John Sevier as governor and Greenville as capital.

MEMORABLE TENNESSEE EVENTS



THE WAR BETWEEN THE STATES

Between 1861 and 1865, many battles were fought in Tennessee, including Shiloh and Murfreesboro (1862); Chickamauga, Chattanooga, and Lookout Mountain (1863); and Nashville (1864). Among the state's famous military leaders was General Forrest, a dashing cavalry officer whose motto was to get there "fustest with the mostest."



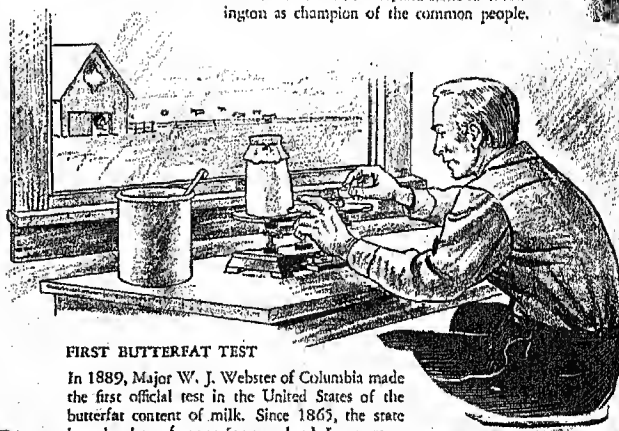
"OLD HICKORY" ELECTED PRESIDENT

In 1828, Andrew Jackson, hero of the Battle of New Orleans in 1815, was elected president of the United States, and came to Washington as champion of the common people.



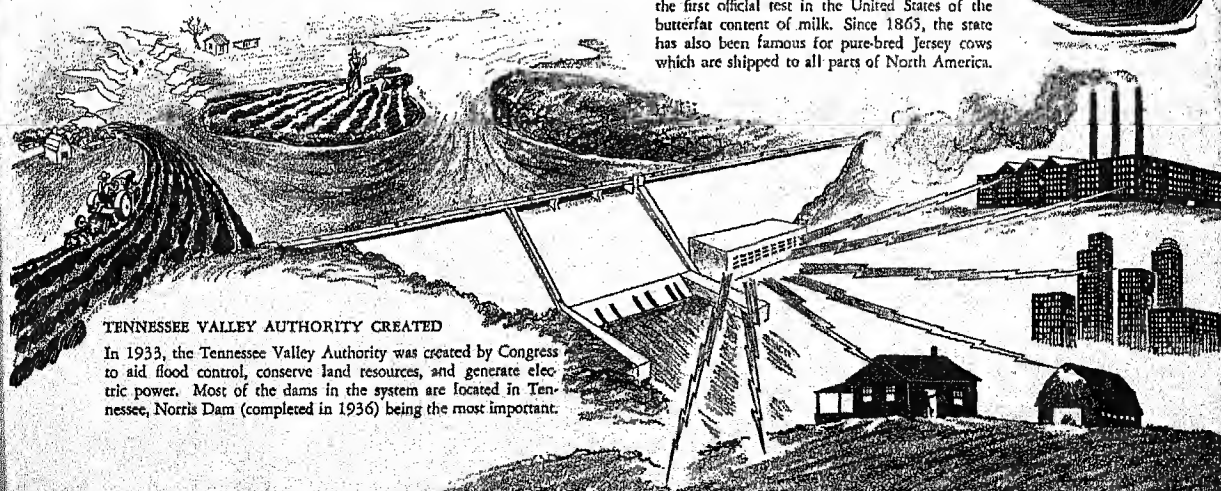
"DAUGHTERS OF THE CONFEDERACY" FOUNDED

At Nashville, in 1892, the United Daughters of the Confederacy was organized by widows, wives, mothers, and sisters of those who had served in the Confederate army or navy.



FIRST BUTTERFAT TEST

In 1889, Major W. J. Webster of Columbia made the first official test in the United States of the butterfat content of milk. Since 1865, the state has also been famous for pure-bred Jersey cows which are shipped to all parts of North America.



TENNESSEE VALLEY AUTHORITY CREATED

In 1933, the Tennessee Valley Authority was created by Congress to aid flood control, conserve land resources, and generate electric power. Most of the dams in the system are located in Tennessee, Norris Dam (completed in 1936) being the most important.

Carolina, and New York, and portions of the national Capitol at Washington, D. C. At Knoxville are the greatest marble-finishing works in America, and the second largest marble quarries. From the great port of Memphis are shipped more cotton and hardwoods than from any other place in the United States. At Nashville is the biggest rayon and cellophane factory in the world, and in the copper district of the southeast is a plant making more sulphuric acid than any other in the United States.

The vast hydroelectric and flood-control projects of the Tennessee Valley Authority provide power to run the great factories and carry the magic of electricity into the homes of the region. The song of rushing waters and mighty turbines echoes the future of Tennessee.

The Land and Its Resources

Extent: Area, 42,246 square miles (285 square miles of which are inland water); thirty-third in size among the states. **Greatest length,** 120 miles; **greatest width,** 430 miles.

Physical Features: *Chief mountain ranges,* Bald, Cumberland, Great Smoky, Iron, Stone, Unaka. *Chief peaks,* Clingman's Dome (6,642 feet), Mount Guyot (6,621 feet), Mount Le Conte (6,593 feet), Roan Mountain (6,227 feet). *Elevation,* highest, Clingman's Dome, 6,642 feet, in Sevier County, eastern border of state; lowest, 132 feet, along the Mississippi River in Shelby County, southwestern corner of state. *Chief rivers,* Hatchie; Loosahatchie; Obion; Tennessee (main tributaries, Big Sandy, Buffalo, Clinch, Duck, Elk, French Broad, Hiwassee, Holston, Little Tennessee, Nolichucky, Powell, Sequatchie, Tellico); Cumberland (main tributaries, Harpeth, Red, Rocky, Stone); on western border, Mississippi. *Chief lakes,* natural, Reelfoot; artificial, Norris Reservoir.

Climate: *Temperature,* average annual, 58.8°; average summer, 76.3°; average winter, 40.3°; lowest on record, -32° at Mountain City (Dec., 1917); highest on record, 113° at Perryville (July, Aug., 1930). *Precipitation,* average annual, 49.92 inches; average Apr. 1 to Sep. 30, 24.42 inches; average Oct. 1 to Mar. 31, 25.50 inches. *Snowfall,* average annual, 9.3 inches.

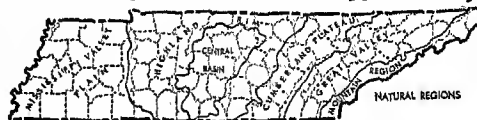
Location, Size, and Surface Features. Tennessee lies on the western side of the Appalachian Mountains and east of the Mississippi River. Travelers from New York to New Orleans, or from Chicago to Miami, are about halfway through their journey when they are crossing Tennessee.

The state is roughly rectangular in shape. Its length from north to south is slightly more than one quarter of its width from east to west. Tennessee is about one sixth the size of Texas, and more than five times as big as Rhode Island, Delaware, and Connecticut combined. Like Missouri, it has eight bordering states, more than have any other states. For boundaries of the state, see the colored map.

From its mountainous eastern border, Tennessee slopes gradually westward to the Mississippi bluffs and bottomlands. The state is divided into six natural regions: the Mountain Region, the Great Valley, the Cumberland Plateau, the Highland Rim, the Central Basin, and the Mississippi Valley Plain.

The *Mountain Region* begins among the rugged peaks of the Great Smoky Mountains, where many ridges rise more than 5,000 feet above sea level. Its highest peak, Clingman's

Dome, is one of the loftiest in the whole Appalachian System. In contrast to the forested tops of most of the mountains are the grass-covered domes of the Balds. The great Unakas—a Cherokee word meaning white—are so high that they are capped by snow in winter and by clouds in summer. The mountain sides are too steep for farming or grazing. Scattered through the region, however, are many fertile coves—level meadowlands extending in size from a few acres to several square miles—that support good crops of corn, tobacco, and fruit. Timber and minerals are plentiful. This region has magnificent scenery: Torrential rivers and cascades, whose sources are bordered by semi-arctic flowers and moss, roar down slopes brilliant with redbud, dogwood, azalea, mountain laurel, and rhododendron. Much of the region is a part of the Great Smoky Mountains National Park. The southeastern tip of the state, barren of vegetation, is the rich copper country.



The *Great Valley* is a part of that valley which stretches from Georgia north into New York, between the Appalachian and Cumberland mountains. In Tennessee it is drained by the Tennessee River and its tributaries. A fertile farming country, it also has great mineral resources. Located here are two of the largest cities in the state: Chattanooga and Knoxville. A little west of the Great Valley is the long, narrow trough drained by the Sequatchi River, with rich soils that grow ample field and truck crops.

The *Cumberland Plateau* rises abruptly from the valley in rocky cliffs, 1,500 to 1,800 feet high. In the south stands famous Lookout Mountain, from which on clear days may be seen seven states. The plateau is covered with scraggly second-growth timber. The soil, laid over rocks, is deeply eroded. However, good crops of vegetables and berries are grown here, and there is much pasture for cattle. This is the great coal-mining region of the state and contains iron ore and other mineral deposits.

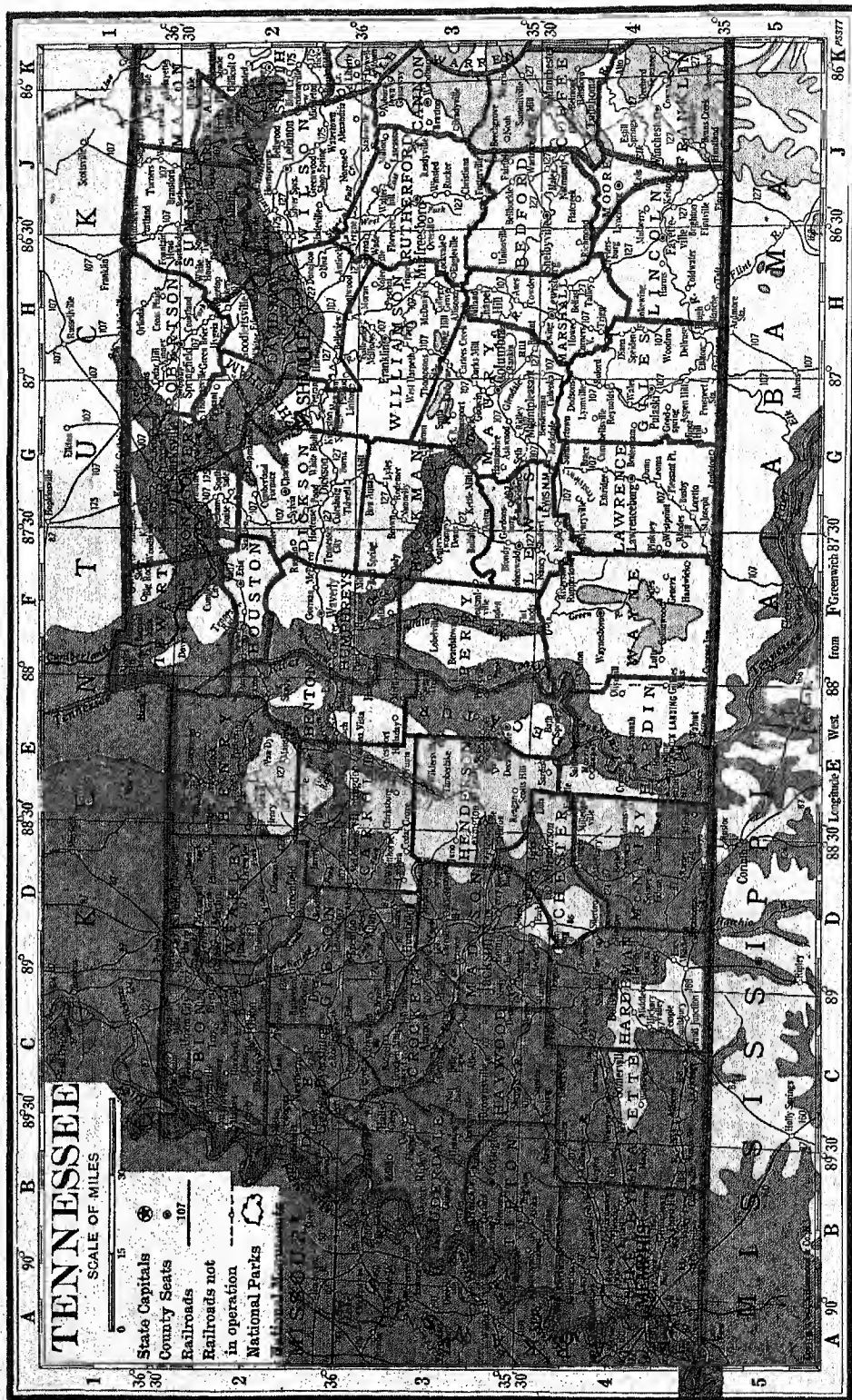
The *Highland Rim* is a great loop of steep hills which parallel the Tennessee River. In the east, hollowed out by the action of water, are sinkholes and caves in the limestone rock that underlies the whole region. It is not a fertile section, though with care good crops of tobacco and Irish potatoes may be grown, and

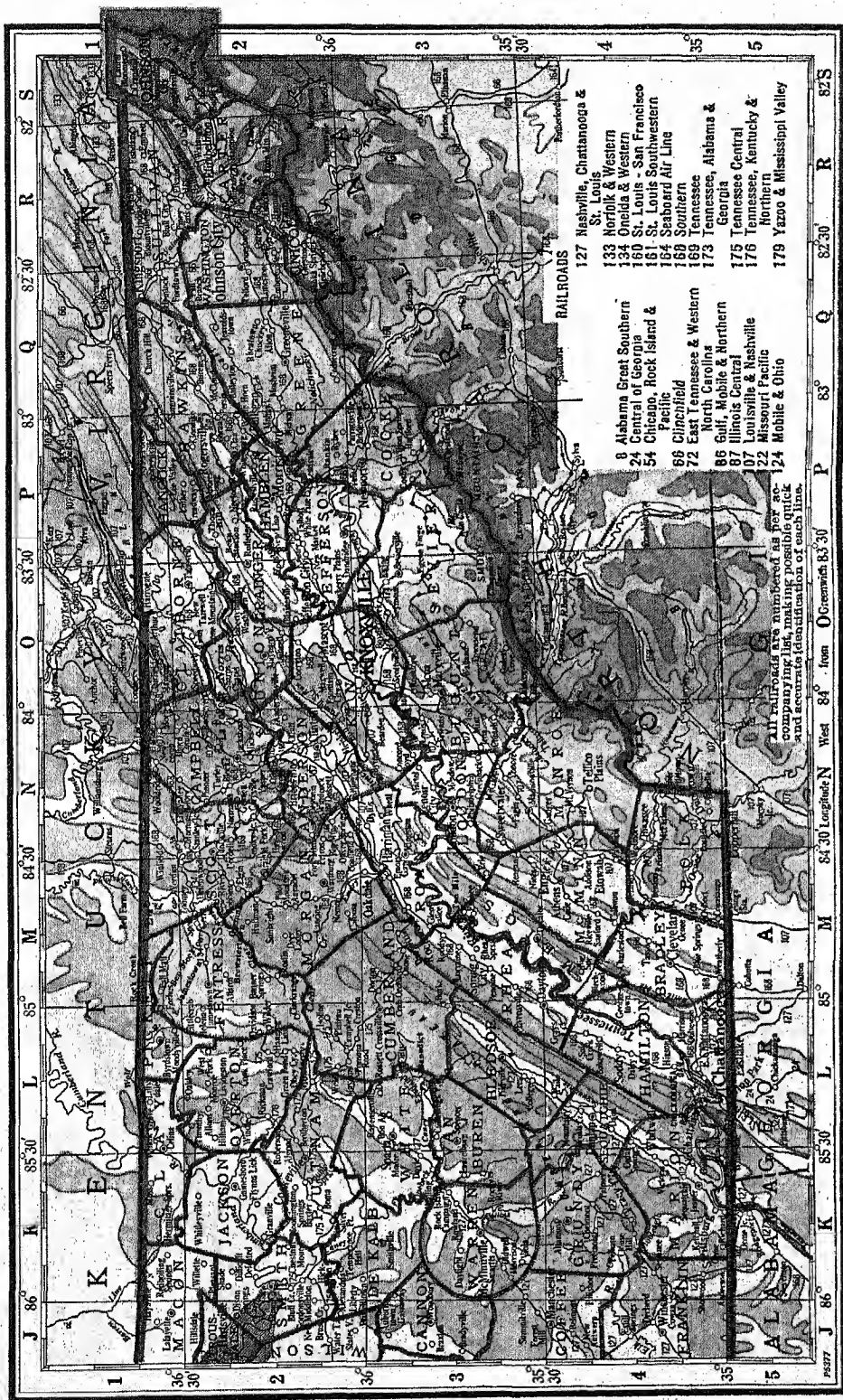
Pronunciation Guide

Chattanooga chat ah noo' gah	Nolichucky nol' ih chuk ee
Chickamauga chik ah mohl' gah	Sequatchie see kwatch' ee
Guyot gee' yoh	Tullahoma tul ah hohl' mah
Le Conte le kont'	Unicoi u' ne hoy
Muskogean mus hohl' gee an	Watauga wah tah' gah

TENNESSEE

Adams, (G1).....	565	Camden, (E2).....	992	Denmark, (C3)....	81	Glendale, (H3)....	197	Lascassas, (J2)....	162
Adamsville, (E4)...	719	Campaign, (K3)...	555	Denver, (F2).....	168	Glenmary, (M2)...	111	Laurel Bloomery, (S1).....	238
Aetna, (G3).....	111	Capleville, (B4)...	168	De Rossett, (L3)...	222	Goin, (O2).....	136	La Vergne, (H2)...	195
Afton, (Q2).....	130	Carter, (R2).....	110	Devonia, (N2)....	226	Goldust, (B3)....	240	Lavinia, (D3)....	113
Alamo, (C3).....	1,137	Carters Creek, (H3)	122	Diana, (H4).....	103	Goodlettsville, (H2).....	1,019	Lawrenceburg, (G4).....	3,807
Alcoa, (O3).....	5,131	Carthage, (K2)....	1,512	Dickson, (G2)....	3,504	Gordonsburg, (G3)	315	Lebanon, (J2)....	5,950
Alexandria, (J2)...	388	Caryville, (N2)...	343	Difficult, (K2)...	115	Gordonsville, (K2)	250	Ledbetter, (D3)...	133
Algood, (M2)....	609	Castalian Sprs., (J2)	111	Dixon Springs, (J2)	231	Gorman, (F2)....	83	Lee Valley, (P2)...	107
Allardt, (L2)....	333	Cedar Grove, (D3)	117	Doeville, (S2)....	193	Grand Junction, (C4).....	560	Lenoir City, (N3)	4,373
Allisona, (H3)...	167	Cedar Hill, (G1)...	749	Donelson, (H2)...	1,332	Granville, (K2)...	205	Lenox, (B2).....	580
Allons, (L2)....	196	Celina, (L1).....	864	Double Springs, (K2).....	230	Graysville, (L4)...	846	Leoma, (G4).....	163
Alpine, (L2)....	183	Centerville, (G4)...	1,030	Dover, (F2).....	960	Greenback, (N3)...	194	Lewisburg, (H4)...	3,582
Altamont, (K4)...	238	Chanute, (L1)....	278	Dowlstown, (K2)...	296	Green Brier, (H2)...	795	Lexington, (E3)...	2,526
Alto, (K4).....	277	Chapel Hill, (H3)...	391	Doyle, (K3).....	360	Greeneville, (Q2)...	6,784	Liberty, (K2)....	316
Andersonville, (O2)	148	Chapmansboro, (G2).....	608	Dresden, (D2)....	1,115	Greenfield, (D2)...	1,509	Liberty Hill, (O2)...	111
Anthrax, (N1)....	172	Charleston, (M4)...	557	Ducktown, (N4)...	1,693	Gruettli, (K4)....	333	Lilydale, (L1)....	223
Antioch, (H2)....	222	Charlotte, (G2)...	470	Dukedom, (D2)...	368	Guild, (K4).....	224	Limestone, (Q2)...	245
Apison, (L4)....	556	Chaska, (N1)....	124	Dunlap, (L4)....	721	Guys, (D4).....	104	Linden, (F3).....	641
Appleton, (G4)...	174	Chattanooga, (L4)...	128,163	Dyeus, (K2).....	111	Hales Point, (B3)...	248	Littletot, (G3)....	114
Ardmore, (H4)...	350	Cherry, (B3).....	126	Dyersburg, (C2)...	10,034	Halls, (C3).....	1,511	Livingston, (L2)...	1,527
Arlington, (B4)...	440	Cheslerfield, (E3)...	135	Eads, (B4).....	116	Hampshire, (G3)...	167	Lobelville, (F3)...	363
Arthur, (O1)....	240	Chestnut Mound, (K2).....	103	Eagleville, (H3)...	485	Hampton, (R2)...	677	Lone Mountain, (O2).....	305
Ashland City, (G2)	957	Chewalla, (D4)....	111	East Ridge, (L4)...	2,939	Harriman, (M3)...	5,620	Lookout Mountain, (L5)...	1,545
Ashport, (B3)....	234	Christiana, (J3)...	277	Eaton, (C3).....	300	Hartford, (P3)...	108	Loretto, (G4)....	1,111
Ashwood, (G3)....	28	Chuckey, (Q2)....	185	Ebenezer, (N3)...	128	Hartsville, (J2)...	1,095	Loudon, (N3)....	3,017
Aspen Hill, (G4)...	224	Church Hill, (Q1)...	370	Edenwald, (H2)...	167	Haydenburg, (K2)	169	Louisville, (N3)...	388
Athens, (M4)....	6,930	Clairfield, (O1)...	249	Edison, (P1)....	113	Heiskell, (N2)...	305	Lucy, (B4).....	175
Atoka, (B4).....	255	Clarksburg, (E3)...	225	Elbridge, (C2)...	193	Helenwood, (M2)...	231	Lupton City, (L4)...	1,391
Atwood, (D3)....	445	Clarksburg, (G1)...	11,831	Elgin, (M2).....	56	Henderson, (D4)...	1,771	Luray, (D3).....	247
Auburntown, (J3)...	337	Clayton, (C2)....	76	Elizabethhton, (R2)	8,516	Hendersonville, (H2).....	499	Luther, (P2)....	138
Baileton, (Q2)....	229	Clementsville, (K1)	100	Elkton, (H4)....	234	Henning, (B3)....	415	Luttrell, (O2)...	582
Barr, (B3).....	233	Cleveland, (M4)...	11,351	Elk Valley, (N2)...	241	Henry, (E2).....	232	Lutts, (F4).....	226
Barlett, (B4)....	400	Clifton, (F4)....	888	Ellendale, (B4)...	100	Henryville, (G4)...	138	Lyles, (G3).....	558
Bath Springs, (E4)	108	Clifty, (L3).....	221	Elmwood, (K2)...	117	Hermitage, (H2)...	143	Lynchburg, (J4)...	390
Baxter, (K2)....	576	Clinton, (N2)....	2,761	Elora, (J4).....	556	Hickman, (K2)...	285	Lynnville, (G4)...	374
Beacon, (E3)....	144	Coalfield, (N2)...	362	Embreceville, (R2)...	352	Hickory Valley, (C4).....	278	McEwen, (F2)....	617
Beans Creek, (J4)...	139	Coalmont, (K4)...	668	Emory Gap, (M3)...	428	Hickory Valley, (C4).....	278	McKenzie, (F2)...	2,019
Bean Station, (P2)	142	Coble, (F3).....	113	Englewood, (M4)...	1,342	Hickory Valley, (C4).....	278	McKinnon, (F2)...	247
Bearden, (N3)....	241	Collegedale, (L4)...	277	Enville, (E4)....	170	Hillsboro, (K4)...	229	McLemoresville, (D3).....	388
Bear Spring, (F2)...	611	College Grove, (H3)	282	Erin, (F2).....	905	Hillsdale, (J2)...	283	McMinnville, (K3)...	649
Beechgrove, (J3)...	109	Collierville, (B4)...	1,042	Erwin, (R2).....	3,350	Hillsdale, (J2)...	283	McNairy, (D4)...	244
Belfast, (H4)....	145	Columbia, (G3)...	10,579	Estill Springs, (K4)	449	Hixson, (L4)....	237	Macon, (B4)....	255
Bell Buckle, (J3)...	355	Como, (D2).....	176	Ethridge, (G4)....	474	Hohenwald, (F3)...	1,088	Madison, (H2)...	894
Belle Meade, (H2)...	2,061	Conasauga, (M4)...	130	Etowan, (M4)....	3,362	Holladay, (E3)...	249	Madisonville, (N3)	965
Bells, (C3).....	1,054	Concord, (N3)....	588	Eva, (E2).....	368	Hollow Rock, (E2)	422	Malesus, (D3)...	138
Bellevue, (N4)...	182	Cookeville, (K2)...	4,364	Evansville, (M3)...	192	Hornbeak, (C2)...	207	Manchester, (J4)...	1,715
Belvidere, (J4)...	100	Copperhill, (N5)...	1,005	Fairview, (G3)...	1,113	Hornby, (D4)....	382	Martel, (N3)....	117
Bemis, (D3)....	659	Cordova, (B4)....	225	Fall Branch, (O2)...	138	Howell, (H4)....	304	Martinsburg, (J2)...	115
Benton, (M4)....	582	Cornersville, (H4)...	343	Fayetteville, (H4)	4,684	Humboldt, (D3)...	5,160	Martin, (D2)....	3,587
Bethel, (G4)....	105	Corryton, (O2)...	138	Finger, (D4)....	416	Huntingdon, (E3)...	1,432	Maryville, (O3)...	5,609
Bethel Springs, (D4).....	560	Cosby, (P3).....	127	Finley, (C2)....	538	Huntland, (J4)...	303	Mascot, (O2)....	2,819
Bethpage, (J2)....	333	Cottage Grove, (E2)	172	Flag Pond, (Q2)...	111	Huntsville, (N2)...	222	Mason, (C4)....	448
Big Rock, (F1)....	216	Cottontown, (K2)...	407	Flat Creek, (J4)...	560	Idlewild, (D2)...	61	Mason Hall, (C2)...	28
Big Sandy, (E2)...	601	Cotula, (N2)....	200	Flat Woods, (F4)...	277	Indian Mound, (F2)	241	Mauzy City, (C3)...	412
Birchwood, (M4)...	111	Covington, (B3)...	3,513	Flintville, (J4)...	162	Indian Sprs., (R1)...	343	Maxwell, (J4)...	109
Blanche, (H4)....	287	Cowan, (J4).....	1,461	Forbes, (M1)....	109	Iron City, (F4)...	367	Meadow, (N3)....	181
Bloomington, (K2)...	223	Crab Orchard, (M3)...	225	Fortdon, (Q2)...	106	Isabella, (N4)....	570	Maynardville, (O2)	416
Blountville, (K1)...	277	Crawford, (L2)...	359	Forest Hill, (B4)...	744	Jacksboro, (N2)...	900	Meadow, (N3)....	131
Bluff City, (R2)...	700	Crockett Mills, (C3).....	116	Fork Mountain, (N2).....	101	Jacks Creek, (D4)...	111	Medina, (D3)....	414
Bolivar, (K2)....	1,314	Cross Plains, (H1)...	228	Fosterville, (J3)...	205	Jackson, (D3)....	24,332	Medon, (D4)....	97
Boma, (A4).....	156	Crossville, (L3)...	1,511	Fountain City, (O2).....	3,335	Jamestown, (M2)...	1,230	Memphis, (A4)...	292,942
Bon Aqua, (G3)...	143	Crump, (E4).....	111	Fountain Head, (J1).....	197	Jasper, (K4)....	1,350	Mengelwood, (B2)...	348
Bordeaux, (H2)...	130	Cumberland City, (F2).....	347	Fowlkes, (C3)....	375	Jefferson City, (P2).....	2,576	Mercer, (C4)....	222
Boys Creek, (O3)...	166	Cumberland Furnace, (G2)...	276	Frankewing, (H4)...	113	Jellico, (N1)....	1,581	Michie, (E4)....	121
Bradley, (B4)....	182	Cumberland Gap, (O1).....	409	Franklin, (H3)...	4,120	Jelton, (H2)....	138	Middleton, (D4)...	430
Bradford, (D2)...	612	Cummingsville, (L3).....	167	Franklin, (H3)...	4,120	Johnson City, (Q2).....	25,332	Midway, (P2)....	124
Bradyville, (J3)...	105	Cunningham, (G2)...	170	Friendship, (C3)...	451	Johnsonville, (F2)...	333	Millan, (D3)....	3,035
Brazil, (C3)....	194	Curve, (C3).....	130	Friendsville, (N3)...	482	Jonesboro, (R2)...	976	Milledgeville, (E4)	144
Brentwood, (H2)...	113	Cypress Inn, (F4)...	277	Fruitland, (D3)...	128	Kelso, (J4).....	83	Millington, (B4)...	730
Briceville, (N2)...	1,443	Daisy, (L4).....	411	Fulton, (B3)....	119	Kenton, (C2)....	809	Minor Hill, (G4)...	559
Brighton, (B4)...	299	Dandridge, (P2)...	488	Gadsden, (D3)...	278	Kerrville, (B4)...	247	Mitchellville, (J1)...	216
Bristol, (R1)....	14,004	Danville, (F2)...	138	Gainesboro, (K2)...	671	Kimberlin Heights, (O3).....	139	Model, (F1)....	103
Brotherton, (L2)...	234	Darden, (E3)....	234	Gallatin, (J2)...	4,829	Kimmins, (F3)...	168	Mohawk, (P2)...	366
Brownsville, (C3)...	4,012	Davidson, (L2)...	111	Gallaway, (B4)...	111	Kingsport, (Q1)...	14,404	Monroe, (L2)....	69
Bruceston, (E2)...	1,003	Daylight, (K3)...	166	Gann, (D3).....	53	Kingston, (N3)...	880	Monteagle, (K4)...	596
Brunswick, (B4)...	200	Dayton, (L4)....	1,870	Garland, (B3)...	160	Kingston Springs, (G2).....	240	Monterey, (L2)...	1,742
Brush Creek, (J2)...	196	Decatur, (M3)...	205	Gassaway, (K3)...	165	Kirkland, (H3)...	114	Montezuma, (D3)...	133
Buchanan, (E2)...	116	Decaturville, (E3)...	433	Gates, (C3).....	383	Knoxville, (O3)...	111,580	Morrisburg, (P2)...	246
Buena Vista, (E3)...	278	Decherd, (J4)....	868	Gatlinburg, (O3)...	890	Kyles Ford, (P1)...	123	Morris Chapel, (E4).....	100
Buffalo, (F3)....	156	Deer Lodge, (M2)...	224	Gennett, (N2)...	113	Lafayette, (J1)...	639	Morrison, (K3)...	278
Buffalo Valley, (K2)	504	Delano, (M4)....	555	Germantown, (B4)	402	La Follette, (N2)...	4,010	Morristown, (P2)...	8,050
Bullgap, (P2)....	284	Dellrose, (H4)...	100	Gibson, (D3)....	284	La Grange, (C4)...	243	Moscow, (C4)....	309
Bumpus Mills, (F1)	214	Del Rio, (P3)....	335	Gillies Mills, (E4)	101	Lake City, (N2)...	1,520	Mosheim, (Q2)...	582
Bunker Hill, (H4)...	183			Gladeville, (J2)...	138	Lancaster, (J3)...	158	Moss, (K1).....	161
Burlison, (B3)...	115			Glass, (C2).....	288	Lancing, (M2)....	170	Mountain City, (S2).....	1,021
Burns, (G2)....	565			Gleason, (D2)....	883				
Burrville, (M2)...	166								
Butler, (S2)....	608								
Bybee, (P2)....	194								
Byrdstown, (L1)...	215								
Calderwood, (O3)...	992								
Calhoun, (M4)....	255								





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See How To Read A Map, opposite page I, Volume A

TENNESSEE (Continued)

Q41

cotton is cultivated in the South. The rocky soil of the Barrens, to the south, is the least fertile in the region. Woodworking plants are found among the excellent stands of cedar trees, and the mineral deposits of the region are used in the large cement plants. This region ends in rolling land along the banks of the Tennessee.

The *Central Basin*, enclosed by the Highland Rim, is drained by the Cumberland River. Its fertile bluegrass meadows support fine herds, and its farms grow excellent field and truck crops. There are also rich phosphate deposits. This is a populous area, with Nashville, the second largest city of the state, at its center.

The *Mississippi Valley Plain* is a hilly region with poor soil. It is rich in many rare fossils; and in the large burial mounds some of the earliest Indian idols, pottery, and ceremonial knives have been found. Toward the west is wind-deposited loess (which see), eighty-five feet or more in depth, forming the Mississippi River bluffs. Below them lie the river bottomlands. Throughout this region are grown field crops, especially cotton.

Rivers, Lakes, and Waterfalls. The state has two large drainage systems—the Tennessee and the Cumberland. These rivers rise in the Great Smokies and flow southwest, then northwest, to join the Ohio River. In the marshy bottomlands that lie beside the Mississippi, the rivers become sluggish. Scattered through the marshes are numerous oxbow lakes, loops and bends that have been left as the channel of the river changed, something that happens often in floodtime.

Many high falls are found in the mountains. One of the most beautiful is Ramsey Falls in the Greenbrier Wilderness of the Great Smokies.

In the northwest corner of the state is shallow Reelfoot Lake. It was formed by violent earthquake shocks during 1811 and 1812, which depressed a forested area so that it filled with water. All the other great lakes of the state are artificial. Among the largest are those behind Norris, Chickamauga, and Pickwick dams in the Tennessee Valley.

Climate. The climate of the Mountain Region is similar to that of the Great Lakes or of New England, with cold winters when snow falls deep and stays for many weeks. The narrow mountain valleys, as well as all other regions of the state, have a much milder climate, with little snow and only brief periods of freezing weather. Here in summer the growing season is long enough to raise cotton, even in some of the northern counties. In the west, the Mississippi Valley Plain has a subtropical climate, with long, hot, oppressive summers. In winter, snow, sleet, and freezing temperatures may be followed within a few hours by mild, thawing weather. No cold spell is of long duration. Rainfall is well distributed, the

heaviest rains coming in late winter and early spring.

Natural Resources. The greatest resources of the state are its fertile lands and abundant water. The swift mountain streams and rivers make it a region of immense potential water power. Under the surface are important mineral resources, especially coal and iron, phosphate rock, marble, and other building stone.

In the wilderness of the Smokies are tracts of virgin timber, mostly fine hardwoods such as oak, maple, hickory, and walnut. In other parts of the state are large second-growth forests. Cedars flourish on the Cumberland Plateau and on the Highland Rim. Along the marshes of the Mississippi Plain grow huge, ancient cypress trees. Animals sought by hunter or trapper range the wooded hills and mountain slopes. They include the Virginia deer, bear, the southern or bay lynx, the red and the gray fox, raccoon, skunk, and mink. Savage wild boars, which are supposed to have escaped from a private estate, are hunted in the mountains. Among the more than three hundred species of birds, the mockingbird and robin are the most plentiful, and the great blue heron, living in huge colonies in Reelfoot Lake, is one of the most beautiful. Wild turkey, duck, and quail are hunted in many parts of the state. The principal game fish are black bass, trout, and jack salmon. Catfish weighing thirty to one hundred pounds often are caught in the Mississippi and Tennessee rivers.

Conservation. Several state and Federal agencies are reclaiming hundreds of thousands of acres of untillable soil and are conserving other resources. Two state-maintained hatcheries at Springfield and Morristown, with eighteen rearing pools throughout the state, restock the rivers and lakes with fish. Tennessee, with Federal aid, maintains a quail farm at Buffalo Spring. A game preserve of 18,000 acres in Cheatham County has been set aside for deer and wild turkey.

The Tennessee Valley Authority helps to develop and conserve the natural resources of Tennessee and of the six other states through which the Tennessee River and its tributaries flow. TVA has built dams to generate power and control floods, replanted forests, and developed educational centers. The largest of the dams is the Norris on the Clinch River, completed in 1936. TVA also provides funds and instruction to help farmers rebuild and conserve the soil. More than 9,500,000 acres, or about half the farm acreage in Tennessee, is included in this project.

The People and Their Work

Population: 2,915,811 (1910), ranking fifteenth among the states. **Density,** 69.5 persons per square mile, ranking sixteenth. **Distribution,** urban, 35.2 per cent; rural, 64.8 per cent. **Largest cities,** Memphis (292,042), Nashville (167,102), Chattanooga (128,163), Knoxville (111,580). For population of other cities, see back of colored map. **Port,** Memphis.

Chief Products: *Agricultural*, cattle, chickens, hogs and pork, horses, mules, dairy products; corn, cotton, eggs, grapes, grass seed, hay, peaches, peanuts, strawberries, sweet potatoes, tobacco, vegetables, walnuts, wheat, wool. *Mineral*, clays, coal, lead, marble, oil, phosphate rock, sandstone, zinc. *Manufactured*, aluminum, automobile equipment, chemicals, cement, clothing, fertilizer, flour, footwear, furniture, iron products, lumber, nonalcoholic beverages, tobacco (snuff, cigars), textiles (cotton, rayon, silk, wool), newspapers and periodicals.

The People. When, in 1541, De Soto explored part of the region now known as Tennessee, it was inhabited by two great tribes of Indians, the Cherokee, and the Chickasaw, and several smaller tribes. Most of the Indians who remained were removed by the Federal Government in 1838 and resettled in the southwest.

The first permanent white settlements were made along the Watauga River, in 1769, by English-speaking people. After the end of the Revolutionary War and the opening of the territory by treaties with the Indians, settlers flocked by wagonloads over the mountain trails from all the other states. Most of them were Scotch-Irish, English, and French Huguenots from the Carolinas and Virginia, and Germans from Pennsylvania. Many were Revolutionary soldiers, taking up land grants made by the Federal Government.

James Needham's diary tells of his being accompanied by "Jim, a black boy," in 1673, but few other Negroes came during the settlement of the eastern section. During the early nineteenth century, the development of great cotton plantations in the great Valley and the Central Basin increased the number of Negro slaves, and Memphis became one of the great slave markets of the South.

Today, the small farmers and hill folk use little Negro labor, and many eastern counties have almost no Negroes, while several areas in the cotton-growing counties of the west, notably Fayette, have more Negroes than whites. The ratio of Negroes to whites in the state as a whole is low, however, for a southern state.

In the late nineteenth century, several groups of immigrants tried to found colonies with co-operative farming and common ownership plans, but most of these settlements were failures. Among the more successful were the German colony still found at Loretta in Lawrence County, and two Swiss colonies, at Hohenwald in Lewis County, and at Gruetli, near Tracy City in Grundy County.

The first United States census (1790) showed most of the inhabitants to be of British stock, and since that time the make-up of the white population has changed very little. Less than 1 per cent are foreign born. The largest number came from Italy, to engage in trade at Memphis. Of the others, the greatest numbers are from Russia, Germany, England, Poland, Canada, and Greece.

Agriculture. Tennessee is primarily an agricultural state. About two thirds of the people cultivate the soil, and more than two

thirds of the land is in farms. The farms usually are small, averaging about seventy-five acres in size. The largest are the plantations along the Mississippi and the horse- and cattle-grazing farms in the Central Basin; the smallest are the mountain-slope farms in the east and along the Highland Rim.

Corn. Since the days of the cave dwellers and mound builders, the chief crop of the region has been corn. In 1904, a high-yield variety was developed by W. H. Neal of Lebanon. The largest yield of corn comes from the Central Basin and from the northwest counties of the Mississippi Valley Plain. Much of the crop is used for fattening livestock or is ground into meal for human consumption. Sweet corn is shipped in midsummer from Sharon and Greenfield.

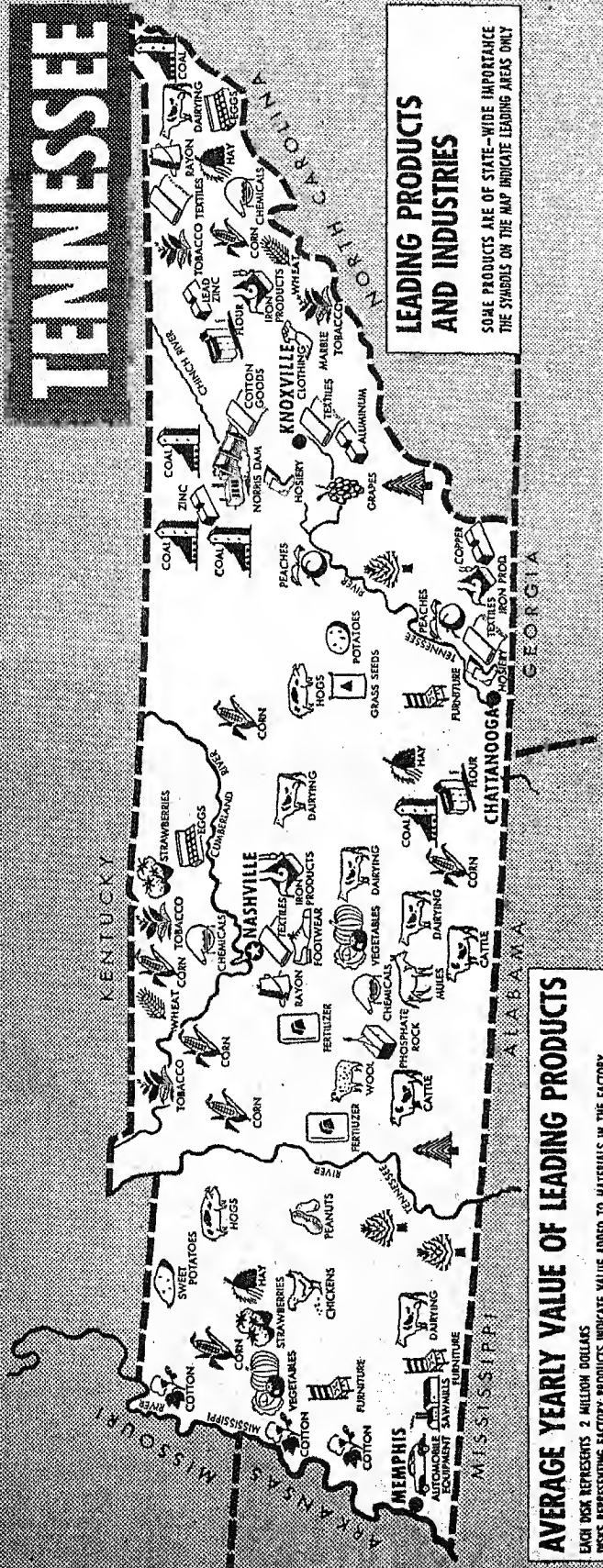
Cotton ranks second in acreage. The great cotton-growing counties extend from the Tennessee River to the Mississippi. Important, too, are Lawrence, Giles, and Lincoln Counties on the south-central border, and Rutherford County in the Central Basin. Memphis is the largest inland cotton-shipping port in the world, drawing upon all the cotton-growing states surrounding it. In Memphis is one of the largest compresses in the world, where bales are made uniform for shipment.

Tobacco is one of the most valuable cash crops of the state. The dark-fired variety is grown in the Black Patch, an area which includes Montgomery, Robertson, and Dickson counties, and all the counties that touch them. The largest markets for this tobacco are at Clarksville and Springfield. Burley tobacco is grown in the mountain coves of the counties north of Knoxville, the finest grades coming from Blountville and Greeneville. The latter city is the Burley market not only for Tennessee but also for Virginia and North Carolina, and here are auctioned more than ninety-four million pounds of this tobacco annually.

Other Field Crops. Hay and forage crops are mostly consumed on the farms where they are grown. Timothy hay has been raised since colonial times; bluegrass is native to the grazing lands of the Central Basin and mountain coves. Lenoir City, Sevierville, and Clarksville are shipping points for hay and grain; Columbia, for forage crops and wheat. In the early eighteenth century, Tennessee was the greatest wheat-growing state in the Union, but overproduction throughout the country caused a collapse of prices. Since then, this crop has been of minor value. Tennessee wheat has a damp-resisting quality, important in the milling of flour shipped to the tropics.

Sorghums are grown throughout the state for local use. Camden is the center of the sorghum molasses and syrup industry. Peanuts are an increasingly important crop, with Tennessee now ranking third in their production.

TENNESSEE

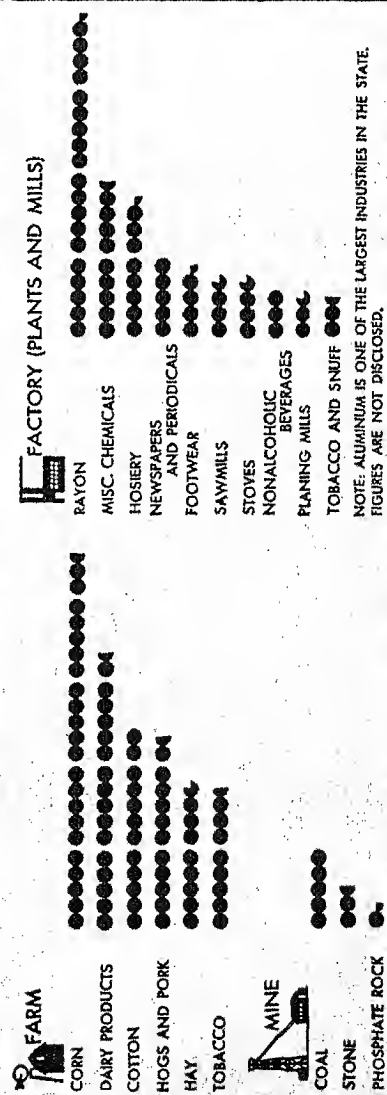


LEADING PRODUCTS AND INDUSTRIES

SOME PRODUCTS ARE OF STATE-WIDE IMPORTANCE
THE SYMBOLS ON THE MAP INDICATE LEADING AREAS ONLY

AVERAGE YEARLY VALUE OF LEADING PRODUCTS

EACH BOX REPRESENTS 2 MILLION DOLLARS
BOXES REPRESENTING FACTORY PRODUCTS INDICATE VALUE ADDED TO MATERIALS IN THE FACTORY



NOTE: ALUMINUM IS ONE OF THE LARGEST INDUSTRIES IN THE STATE.
FIGURES ARE NOT DISCLOSED.

LAND USE

CROPS	PASTURE	FORESTS	OTHER
28%	14%	48%	10%

Based on latest U.S. Government statistics; prepared for the exclusive use of the
WORLD BOOK ENCYCLOPEDIA by Photograph Corporation

Humphreys, Waverly, and Camden have cleaning plants in which the bulk of the peanut crop is prepared for shipment. Sweet potatoes are shipped from Huntingdon and Dresden.

Truck and Fruit Crops. The great truck-growing region centers about the northwest counties, especially Weakley, Gibson, and Dyer. Trucks loaded with snap beans, cabbage, sweet



peppers, okra, and tomatoes crowd the highways outside Sharon, Greenfield, Milan, Humboldt, and Rutherford nightly from early summer to late fall. In June, Tennessee ships more strawberries than does any other state.

The mountain farmers pick and ship wild blueberries and blackberries. Peaches and apples are grown north of Knoxville. Walnuts are grown commercially around Rogersville and Morristown.

Some Unusual Crops. Five to fifteen barrels of watercress are picked each day, winter and summer, at Strawberry Plains. Around Lenoir City, ginseng, a medicinal herb, is cultivated for export to China. Ferns and evergreens are grown for shipment from Cosby in the mountains, and Clinton in Anderson County has large nurseries for evergreens.

Livestock. The value of the livestock on the farms of Tennessee is equal to the value of all its field and garden crops, and the income from cattle, horse, and poultry farms surpasses the income from the tobacco and cotton crops combined. The bluegrass regions of the Central Basin support many fine herds of purebred horses, dairy and beef cattle, mules, poultry, and hogs. The Barrens around Monteagle on the Highland Rim are frequently burnt over, and the revived vegetation the following year makes excellent pasturage for cattle, hogs, and goats.

Columbia, a livestock center, is especially famous as a mule market. On Mule Day in April, buyers come from all parts of the world to purchase Tennessee mules. Lewisburg is another livestock market, handling race horses and the Tennessee walking horse. Arabian horses, imported as early as 1825, are raised on the bluegrass pastures of the Central Basin. The Irish Nomads are the great horse traders of Tennessee and of other southern states. They hold a horse fair annually in April at their campsite near Nashville. Purebred Shorthorn beef cattle are shipped from Rutledge. Shipping centers not only for dairy products but also for dairy cattle include Cookeville, Pulaski, and Fayetteville.

Tennessee annually produces about one million hogs, most of which are butchered locally

for pork, especially in the highland regions. Sheep raising has become important on the Highland Rim; Lewisburg is a shipping point for both sheep and hogs. Poultry is a major source of income in eastern Tennessee. Milk-fed broilers, first developed at Morristown, are marketed there in great quantities.

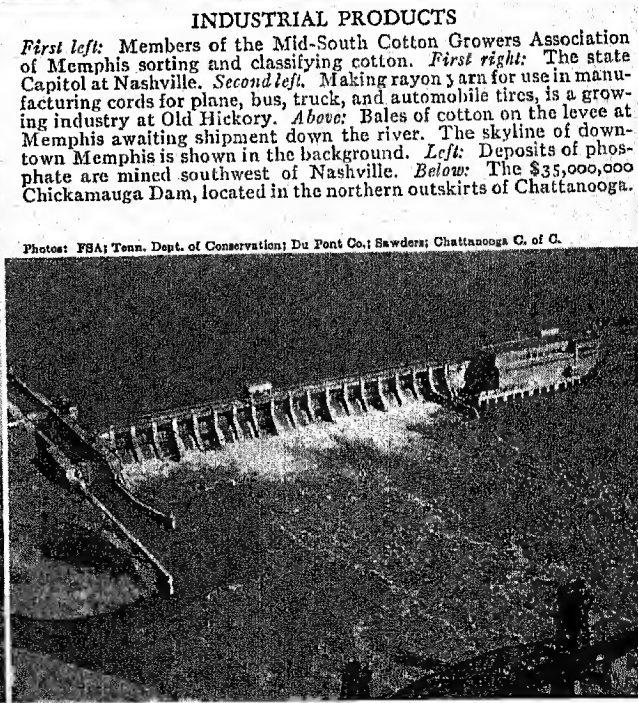
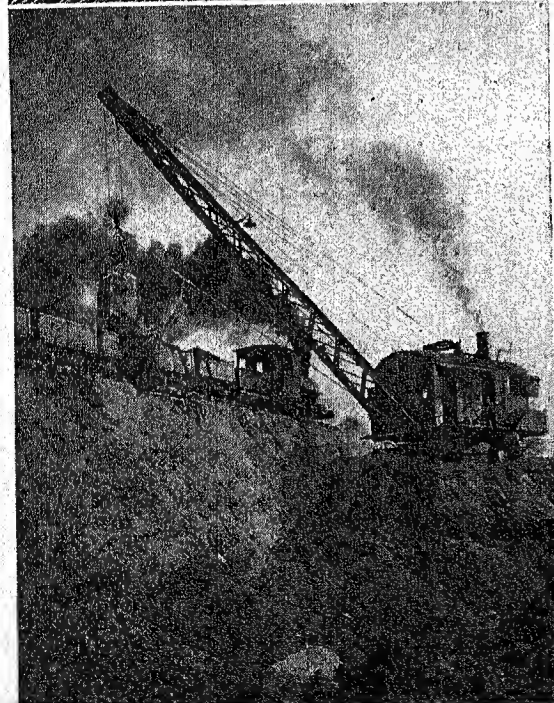
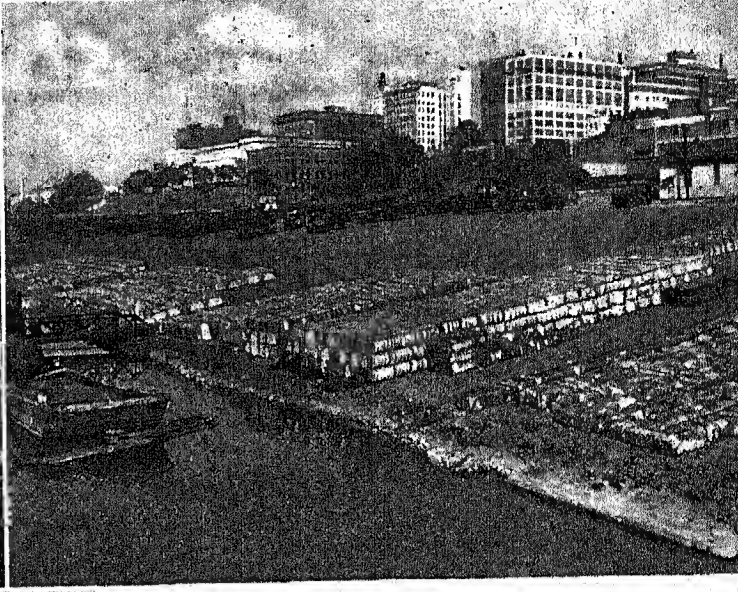
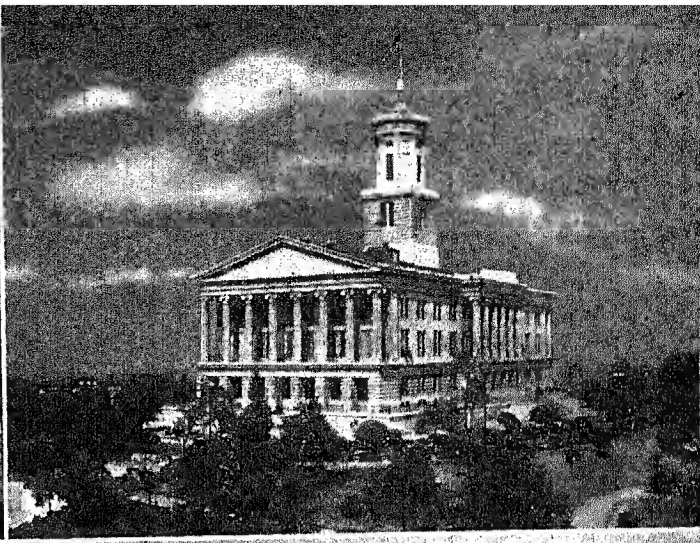
Manufacturing. With plenty of coal and numerous hydroelectric plants to furnish power, and with the improvement of waterways to the Mississippi to give good transportation, Tennessee has great advantages for developing its industries. Other factors are the surplus of native labor and the immense quantities of raw materials.

The *textile industry* is of first importance in the state. One of the largest rayon-yarn mills in the world is located at Old Hickory near Nashville. Associated with it are mills for making carbon bisulphate, the chemical used for dissolving wood pulp and linters, from which rayon yarn is made. Kingsport is a great center for the manufacture of rayon and photographic supplies, for papermaking and cloth-making, and for printing. At Kingsport, too, is a plant for producing methanol (wood alcohol), used in making rayon by the phenolic process. (See RAYON; PLASTICS.) This chemical also is used in manufacturing munitions, yarns, camera film, and such by-products as insecticides and fuels.

Several towns in eastern Tennessee—Morristown, Lenoir City, and Dayton—and large cities such as Jackson, Columbia, and Knoxville, have many cotton textile plants and garment factories. The biggest cotton mill in western Tennessee is at Dyersburg. Woolen fabrics are woven at Knoxville, Harriman, Cleveland, and Springfield, and wool blankets at Lebanon. Cotton cord for tires is made at Shelbyville. The cottonseed oil industry centers around Memphis.

Food Processing ranks second in importance to textile manufacture. There is a large milk-condensing plant in Lewisburg, and other milk products plants are at Gallatin and Fayetteville. Large canneries and bottling works are at Pulaski, Morristown, Sevierville, and Dayton. Nashville has large stockyards and a meat-packing plant.

Forests and Forest Products. Memphis is the largest inland river port handling hardwoods in the country; these come not only from the Tennessee woodlands, but also from surrounding states. An important lumber trade centers around Knoxville and Chattanooga. Much wood is ground into pulp for the rayon and paper industries. Chemicals are distilled from wood at huge works in Kingston and other points for use in tanneries, rayon-yarn mills, and paper-pulp plants. Furniture is made at Bristol, Morristown, Lenoir City, Columbia, Knoxville, and Chattanooga. Cedar



INDUSTRIAL PRODUCTS

First left: Members of the Mid-South Cotton Growers Association of Memphis sorting and classifying cotton. *First right:* The state Capitol at Nashville. *Second left:* Making rayon yarn for use in manufacturing cords for plane, bus, truck, and automobile tires, is a growing industry at Old Hickory. *Above:* Bales of cotton on the levee at Memphis awaiting shipment down the river. The skyline of downtown Memphis is shown in the background. *Left:* Deposits of phosphate are mined southwest of Nashville. *Below:* The \$35,000,000 Chickamauga Dam, located in the northern outskirts of Chattanooga.

Photos: FSA; Tenn. Dept. of Conservation; Du Pont Co.; Sawders; Chattanooga C. of C.

is fashioned into tubs, vats, casks, and pencils at Murfreesboro and Shelbyville. Ash wood is made into baseball bats, tennis rackets, and implement handles at Tullahoma. In the highlands, railroad ties are cut.

Minerals and Metal Products. More than seventy minerals are found in the state. Underlying the Cumberland Plateau is a high grade of bituminous or soft coal, the most important mineral resource of the state. Approximately 5,000,000 tons of coal are dug annually. The coal mine at Morley is one of the few in the nation entirely run by electricity; other large mines are at La Follette, Coal Creek, Briceville, Dayton, and Oneida.

The state ranks third in marble production. Tennessee marble is noted for its purity of color, ranging from pale gray or pink to jet black, and for its ability to take a high polish. The second largest quarry and the largest marble-finishing works in the nation are at Marbledale near Knoxville, which is the shipping center for building stone. Other quarries are at Rutledge and Columbia. Sandstone is quarried at Crab Orchard and at Sewanee. The state leads in the shipment of marble fragments, a product used in mosaic (which see).

Tennessee is second only to Florida in the production of phosphate rock. The bulk of this product, quarried at Mount Pleasant, is used to manufacture nitrates, fertilizer, and explosives at Muscle Shoals in Alabama.

The three great dams at Calderwood, Monroe, and Blount supply the vast quantities of electric power necessary for making aluminum at Alcoa, in the largest aluminum foundry in the world. Some bauxite for this industry is found in Tennessee, but most of it is brought from Arkansas and South America.

Zinc is mined at Strawberry Plains and Embreeville; at the latter town, lead and manganese also are produced.

Although Tennessee is one of the largest producers of copper ores east of the Rockies, it ships little raw or smelted copper, because the copper sulphides found here are most important in the making of sulphuric acid, iron slinters (literally "cinders," an important ingredient in making cast iron), and in the refining of gold and silver. The largest sulphuric acid plant in the nation is at Isabella; and Ducktown and Copperhill are also copper-mining towns.

The clays of the state are used in the potteries at Erwin, which turn out 30,000 pieces a day; at Norris, which make beautiful porcelain and fine china from kaolin; and at Jasper, which has the oldest potteries. Tile and brick kilns are centered at Columbia.

Transportation. Indian trails, which the early pioneers turned into wagon tracks, crisscrossed Tennessee in the early days and became the chief overland routes. Daniel Boone in 1775 blazed the famous Wilderness Road

across the northwest corner, passing the present site of Kingsport, running into Kentucky through Cumberland Gap, and then turning south to end at Nashville. The Natchez Trace (highway) had been the ancient Path of Peace of the Chickasaw Indians, and by a treaty of 1801 was opened to the white man. It ran from Nashville to Memphis, then along the Mississippi River to Natchez, Miss.

Because waterways were readily available, the development of roads, and later of railroads, was long delayed. Many private companies during the early 1800's built turnpikes on which tolls were still being charged one hundred years later. Most of these roads radiated from Memphis and Nashville, and the larger towns of the Central Basin and Mississippi Plain.

In 1913, road-building legislation was passed, and under the vigorous administration of Governor Austin Peay (1923-1927) an extensive program of construction was put into effect. Today, the principal cities are connected by hard-surfaced roads, while improved roads reach even the remotest hamlets.

The first railroad was the Nashville and Chattanooga, completed in 1856. In 1857, the Memphis and Charleston linked Tennessee with the cities of the Atlantic coast. During the War between the States, roads and railroads were destroyed, and were not rebuilt for several years. Tennessee now has more than 4,000 miles of railroads. For a list of the railroads, see the colored map.

The navigable waters of the Cumberland and Tennessee rivers early became the cheapest passenger and freight routes. State and Federal funds were appropriated in 1830 to improve river transportation by deepening and dredging the dangerous shoal waters at Muscle Shoals in Alabama, and at other points along the two rivers. In 1890, again with Federal aid, two canals were built to by-pass Muscle Shoals. Wilson Dam, at the same point, was completed in 1925 to give Chattanooga and Knoxville and the inhabitants of eastern Tennessee a year-round waterway to the sea.

The state has more than twenty airports. Several national air lines serve the largest cities.

Press and Radio. The first newspaper in the state was the *Knoxville Gazette*, founded in 1791, by George Roulston. When railroads were spreading throughout the nation in the 1830's, the upland farmers agitated for the building of railroads in eastern Tennessee through their paper, the *Railroad Advocate*, founded in 1831. This was the first paper in the United States devoted solely to railroading.

Today the state has several important daily newspapers, including the *Chattanooga Times, News*, and *Free Press*; the *Knoxville Journal* and *News-Sentinel*; the *Memphis Commercial*

Appeal and *Press-Scimitar*; the *Nashville Banner* and *Nashville Tennessean*. In all, there are about 150 newspapers, of which about thirty are dailies, and nearly one hundred periodicals. Nashville is a large publishing center.

Each of the large cities has two or more radio broadcasting stations. WSM at Nashville, the most powerful in the state, in 1928 became one of the first stations to make a regular feature of the broadcasting of folk music. Other large stations are WMC, WMPs, WREC, at Memphis; WLAC and WSIX at Nashville; WNOX and WROL at Knoxville; and WDOJ and WAO at Chattanooga.

Social and Cultural Achievements

Educational Institutions: *State Teachers Colleges*, at Johnson City, established in 1909; at Memphis, 1909; at Murfreesboro, 1909; George Peabody, at Nashville, 1875. *Other Colleges, Universities, and Institutions*, Bethel, Bob Jones, Carson-Newman, King, Lambuth, Madison, Maryville, Lilligan, Tennessee, and Tusculum colleges; Scarritt College for Christian Workers; Cumberland, Lincoln Memorial, Union, and Vanderbilt universities; University of Chattanooga, University of the South, University of Tennessee; Tennessee Polytechnic Institute. *Negro Institutions*, Tennessee Agricultural and Industrial State Teachers College; Knoxville, Lane, Le Moyne, Meharry Medical, Morristown Normal and Industrial colleges; Fisk University.

State Welfare, Correctional, and Penal Institutions: *Children*, Tennessee Children's Home, Tennessee Industrial School, State Training and Agricultural School for White Boys, and Vocational School for Colored Girls at Nashville; State Training and Agricultural School for Delinquent Negro Boys at Pikeville; Vocational School for White Girls at Tullahoma. *Physically handicapped*, Tennessee School for the Blind at Nashville; Tennessee School for the Deaf at Knoxville. *Mentally handicapped*, Tennessee Home for the Feeble-Minded at Donelson; Western State Hospital at Bolivar; Central State Hospital at Nashville, and Eastern State Hospital at Knoxville. *Prisons*, Tennessee State Penitentiary at Nashville, Brushy Mountain State Prison at Petros, and Fort Pillow State Farm.

Education. The earliest schools of Tennessee were founded by religious denominations. Samuel Doak, a minister, established the first graded school in 1780 in a log house near Jonesboro; three years later it became Martin Academy, and in 1795 it was chartered as Washington College. Many other academies and private schools were established in the early nineteenth century, and later became colleges or universities.

In 1854, against bitter opposition, Governor Andrew Johnson obtained adoption of a state law establishing the first state-wide tax-supported school system in Tennessee. Johnson had not learned to read until he reached manhood, and he felt deeply the necessity of free education for all.

The War between the States disrupted education, and not until 1873 were public schools firmly re-established. In 1893 the legislature provided for secondary schools; and in 1899 the counties were empowered to create high schools. School attendance was made compulsory for children between six and eighteen in 1914, and consolidation of rural schools began in 1924.

Public schools are administered by county boards of education, supervised by a state department of education.

Some of the most notable experiments in education in the state have been in the teach-

ing of adults. The Alvin C. York Agricultural Institute, the Highlander Folk School, and the Cumberland Homestead Project serve rural sections, while other adult-education projects open new opportunities for the people of the factory towns. TVA has done unusual work in vocational training for adults.

Among the leading institutions of higher learning are:

George Peabody College for Teachers, Nashville. A coeducational institution, founded in 1875 by the trustees of the Peabody Education Fund, established for the promotion of southern education by the Massachusetts financier, George Peabody. (See PEABODY EDUCATION FUND.)

University of the South, Sewanee. School for men, chartered in 1858 under the auspices of the Protestant Episcopal Church. Courses include arts and sciences, and theology.

University of Tennessee, Knoxville. Coeducational, state-supported. Chartered as Blount College in 1794, became East Tennessee College in 1807, and the University of Tennessee in 1879. Colleges include liberal arts, agriculture, engineering, home economics, law, business administration, and education. The graduate school of biological sciences, the colleges of medicine and dentistry, and the schools of pharmacy and nursing are in Memphis. The junior college is at Martin. Since 1882, the university has maintained an agricultural experiment station at Knoxville; substations are at Clarksville, Columbia, Greeneville, and Jackson.

Vanderbilt University (which see), Nashville.

Among the leading colleges and universities for Negroes are:

Fisk University (which see), Nashville.

Meharry Medical College, Nashville. Organized in 1876 as the medical department of Central Tennessee College (later known as Walden University). It became an independent institution in 1915, and today it is the largest school of its kind, granting degrees in medicine, dentistry, pharmacy, and nursing.

Libraries. The first library in Tennessee was the Nashville Library Company, founded in 1814. A state library was established in 1854, and several mercantile libraries to serve working men were created between 1850 and 1860. In 1897, a state tax was levied to help support public libraries in towns of 20,000 or more inhabitants; and provision was made in 1909 for the maintenance of school libraries. Since 1910 many rural communities have been served by bookmobiles. A State Division of Libraries was created in 1937 to co-ordinate library activities.

Today, sixty counties have library systems, which make service available to 62 per cent of the people. The state library has one of the finest collections of law books in the South, as well as complete records of Tennessee history and early writings. The Cossitt Library in Memphis has an unusually fine music collection, and the oldest and most complete file of Memphis newspapers in the state.

Arts and Crafts. Among the early settlers of Tennessee were many who excelled in weaving coverlets and rugs, in designing quilts and pottery, in wood carving and basketmaking. In the highland regions, handicraft skills have been handed down from generation to genera-

tion. The craftsmen of today are encouraged by the Southern Handicraft Guild to develop their skills and to preserve the best of the early designs.

The early houses were single-roomed structures of logs, or occasionally, of stone. When more accommodations were needed, a second house was built and joined to the first by an open-roofed porch, called a "dog-trot." The hot summers made this a particularly pleasant addition. The larger farmhouses and town homes were usually square dwellings to which great pillars and porches were added during the Greek Revival period. The Hermitage, the home of Andrew Jackson near Nashville, is typical.

William Strickland, an outstanding architect of the state, was first president and one of the founders in 1836 of the American Institution of Architects. He is famed for designing the United States Mint at Philadelphia, and for his restoration of Independence Hall. He also designed the Capitol at Nashville.

William Edward West, the first Tennessee painter to win recognition, not only painted noted political and social leaders of the state, but became famous in Europe for his portraits of Byron, Shelley, and other great men. Other well-known Tennessee artists include John W. Dodge, painter of miniatures; George De Forest Brush, who painted many portraits of Indians; and Cyrus Le Roy Baldridge, whose studies of African Negro types, exhibited at Fisk University, comprise the most complete collection of its kind in the country. Art education is furthered by the Brooks Memorial Art Gallery, established in Memphis in 1916, and the James Lee Memorial Academy of Arts, established at Nashville in 1925.

Tennessee has made many contributions to American music. In the mountains, English ballads of the Elizabethan period are still sung. Drawing from the rich musical lore of the Negro plantation workers, the Fisk Jubilee Singers have sung spirituals in many parts of the world. The miner and the railroad man have their somber work songs, especially in the highlands of Tennessee. The most famous is "Casey Jones," based on a true tale of a Tennessee engineer.

A tradition of native humor in literature was begun by David Crockett, one of the earliest writers on the exploits of the hunter, politician, and backwoods hero, and continued by George Washington Harris and Opie Read. A novelist of first rank, T. S. Stribling of Clifton wrote of modern industry in *Teeftallow* (1926), *The Forge* (1931), and *The Store* (1933). Among Roark Bradford's delightful Negro fiction is *Op' Man Adam an' His Chillun*, a collection of Bible stories as told by a Negro preacher, recreated in the drama *Green Pastures*. Dramatic talent is developed by the Memphis Little

Theater Group and the Tennessee Playmakers of Nashville.

Religion. Among the first permanent settlers of the Watauga and Holston river valleys were many Scotch-Irish Presbyterians, followed by the Methodists and the Baptists. The great Methodist preacher, Bishop Francis Asbury (which see), made many converts. In 1778 he established the system called circuit riding. By riding in a great circle a minister could serve several communities in the more remote rural districts or "circuits." In that year, too, Bishop Asbury organized at Half Acres the first Methodist conference west of the Alleghenies.

As early as 1810, Roman Catholic missionaries visited the region, and in 1830 a Catholic parish was established in Nashville.

James H. Otey founded the first Episcopal communion at Franklin in 1827, and became the first state bishop. He also helped to establish the University of the South at Sewanee. A more famous Tennessean, perhaps, is the Episcopal bishop, Leonidas Polk, who was active in the armics of the Confederacy. His grave at St. John's Church, near Columbia, is the object of an annual pilgrimage on Whit-sunday.

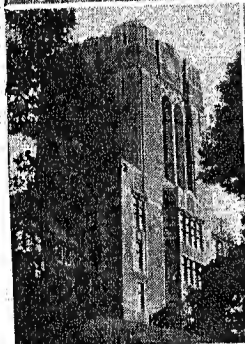
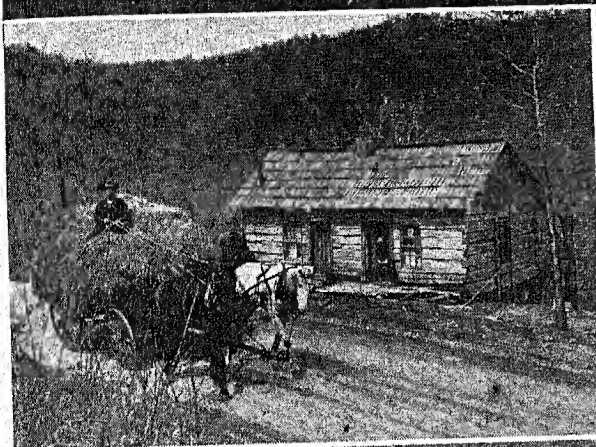
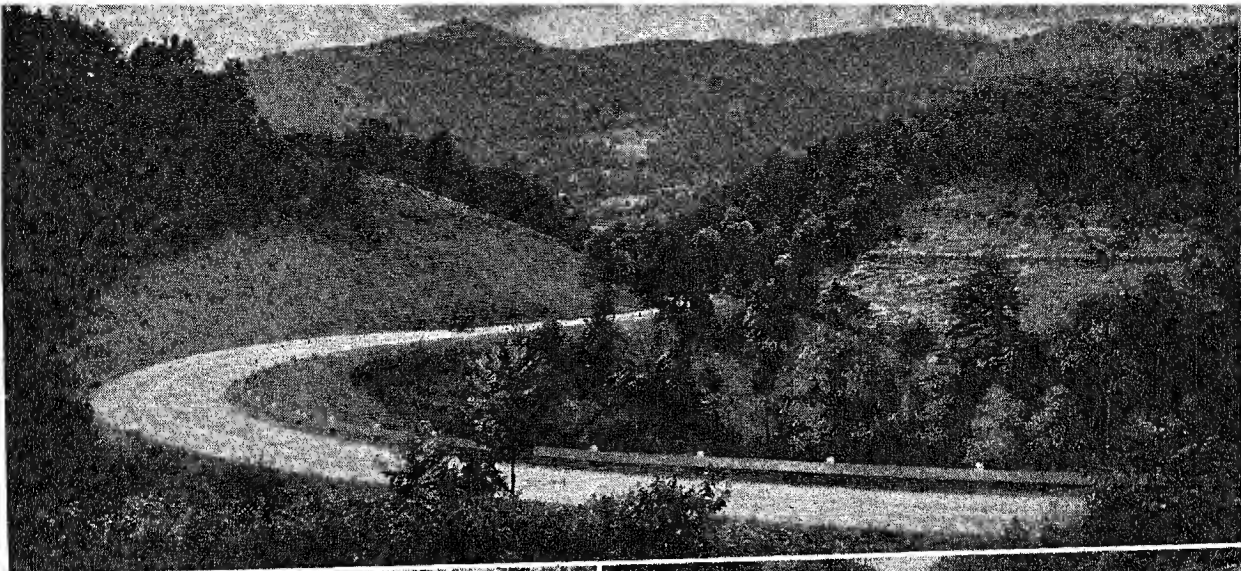
Today, the principal denominations in Tennessee in order of membership are the Baptist, Methodist, Roman Catholic, Disciples of Christ (Christian), and Presbyterian.

Social Welfare. Since 1877, when the first state board of health was created, the movement to protect the health of citizens of Tennessee has spread until today more than seventy counties have full-time health departments. In 1937 the board of health was reorganized and named the Public Health Council. This agency enforces laws regulating sanitation, stream-pollution, the production and distribution of milk and other dairy products, and water supplies for towns and cities.

A law prohibiting the employment of any child under twelve years of age was passed in 1893. Eight years later, the age limit was put at 14; and in 1911 the employment of children in hazardous occupations was forbidden. Other progressive laws include a workmen's compensation act (1911), a mother's pension law (1915), an unemployment compensation law (1936), and a law creating a central employment service (1933).

Recreation and Outdoors

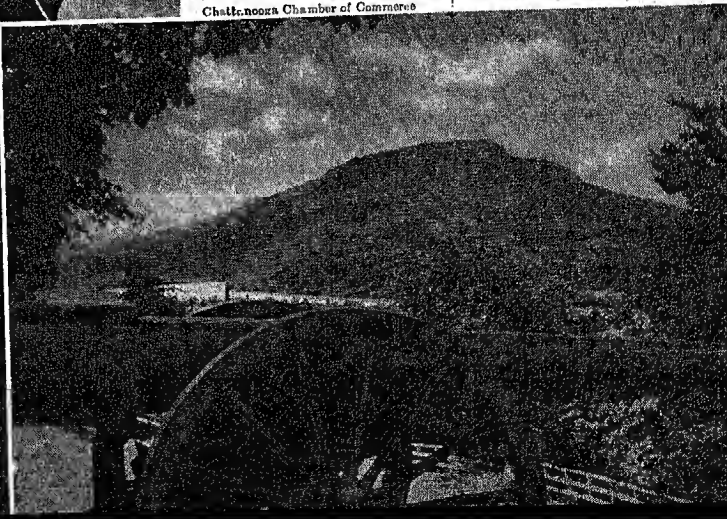
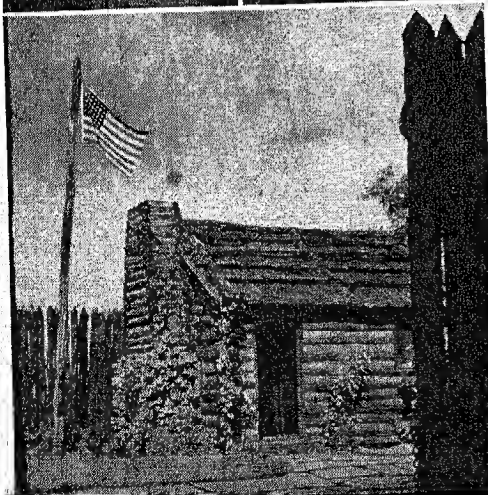
Where the Indians and early settlers tracked bear and deer for food and clothing, the modern Tennessean finds raccoon, possum, and wild fowl as targets for his gun, and game fish in the streams and lakes. The fall duck hunting season at Reelfoot Lake attracts sportsmen not only from Tennessee but from many other states as well. The mountain wonderland of



PICTURESQUE TENNESSEE

Top: A scene along the Tennessee Valley Authority's heavy duty concrete highway between Norris Dam and Lake City. *Second left:* A mountain home in the Cumberland Plateau Region. *Above:* Bald River Falls in Cherokee National Forest. *Left center:* Tennessee walking horses, the smoothest-gaited saddle horses known. *Third left:* Ayres Hall, the Liberal Arts Building of the University of Tennessee at Knoxville. *Fourth left:* Replica of the original Fort Nashville, a 1780 settlement that later became Nashville. *Below:* Historic Lookout Mountain at Chattanooga, where the Battle of Lookout Mountain was fought in 1863. The gun marks the position of the Union Battery.

Photos: TVA; Tennessee Dept. of Conservation; Ewing Galloway; Gendreau; Chattanooga Chamber of Commerce



eastern Tennessee is familiar to lovers of scenic beauty from every state in the Union.

State and National Parks and Forests. Millions of acres within the state have been set aside as state and national forests and parks. The national forests include Cherokee (1,204,102 acres), shared with North Carolina; Pisgah (a small section of which lies in Tennessee); and the Forest of Discovery (319,900 acres). One of the national wonders is the Great Smoky Mountains National Park (see PARKS, NATIONAL), lying along the boundary between Tennessee and North Carolina. Many historical parks and monuments have been established. Among these are the Cumberland Gap National Historical Park, lying on the border between Tennessee and Kentucky; the Meriwether Lewis National Monument, near Lawrenceburg; and various national military parks: the Chickamauga and Chattanooga, near Chattanooga; Fort Donelson, near Clarksville; Shiloh, at Pittsburg Landing; and Stone's River, near Murfreesboro.

Among the state parks, most of which have facilities for swimming, camping, and hiking, are:

Cedars of Lebanon (7,847 acres), near Lebanon. A wild game refuge in the last remaining stand of red cedar in the state. Created, 1934.

Chickasaw (11,215 acres), near Henderson. Forest land has been replanted by the United States Department of Agriculture, to reclaim eroded soil and to preserve wild life. This was once the home of the ancient mound builders, and, later, of the Chickasaw Indian Nation. Created, 1934.

Cumberland Mountain (1,300 acres), near Crossville. The center of the park is Cumberland Homesteads, where pottery making, weaving, wood carving, quilt making, and rugmaking are done by native craftsmen. Created, 1937.

Fall Creek Falls (15,776 acres), near Pikeville. Developed by the National Park Service. Fall Creek Falls (256 feet high), Rock House Falls (125 feet), Piney Falls (85 feet), Cane Creek Falls (80 feet), and Walling Mill Branch Falls (50 feet) all contribute to the scenic grandeur of the park. Created, 1934.

Natchez Trace (42,000 acres), near Lexington. A game sanctuary established on reforested lands. This commemorates one of the earliest highways in America, the Path of Peace of the Chickasaw Indians, which later joined Nashville and Memphis with Natchez, Miss. Created, 1934.

Pickett (11,500 acres), near Jamestown. Many arrowheads, bits of pottery, and other Indian relics in shelter caves. Created, 1934.

Shelby (12,000 acres), near Locke. Because more Negroes than whites live in Shelby County, this area was set aside especially for their use. Created, 1934.

Standing Stone (8,500 acres), near Livingston. Magnificent mountain scenery, dense forests, unusual rock formations, many rushing streams, and waterfalls. The forest floor is carpeted with wildflowers. Created, 1934.

Other Interesting Places to Visit. Among the places that attract thousands of visitors annually are:

Andrew Johnson Home and Tailor Shop, Greeneville. The seventeenth President of the United States lived here during his early campaigning days, when he was called "the little tailor of East Tennessee."

The Hermitage, near Nashville. Home of Andrew Jackson, seventh President of the United States.

First built around 1805 as a plain, square farmhouse, it was enlarged and rebuilt, with handsome columns and porches, and typifies the best Southern Colonial architecture. Its old slave quarters are still standing. On the grounds are the tombs of Jackson and his wife, **James K. Polk Home**, Columbia. Home of the eleventh President of the United States. Contains relics of the Polk family, and household furnishings of the early nineteenth century.

Lookout Mountain, near Chattanooga. A rocky promontory which rises 1,400 feet above the Tennessee River at Moccasin Bend. Famous as the scene on November 24, 1863, of the "Battle above the Clouds," it became a part of the Chickamauga and Chattanooga National Military Park in 1935.

Reelfoot Lake, near Tiptonville. An 18-mile-long natural wonder, formed in 1811-1812, when the Mississippi rushed in to fill the huge depression caused by an earthquake. This lake, made weirdly beautiful by its submerged forests, attracts fishermen, hunters of ducks and geese, and trappers of raccoon, mink, and muskrat.

Government

National: Electoral votes, 11. Representatives in Congress, 9.

State: Senators, 33; representatives, 99. *Capital*, Knoxville, 1796-1807; Kingston, 1807; Knoxville, 1808-1811; Nashville, 1812-1815; Knoxville, 1816-1819; Murfreesboro, 1819-1826; Nashville, since 1827.

Counties: 95.

The first state constitution of 1796 gave all free men, including free Negroes, the right to vote. No religious test was required of candidates for public office, and this provision was continued in later constitutions. In 1835 a revised constitution was adopted. At this time the free Negro's right to vote was taken from him; he was no longer required to pay a poll tax to serve in the state's military forces.

The present constitution was adopted in 1870. It gave the power of veto to the governor, provided special courts, and restored the vote to the Negro. Amendments to this constitution may be proposed in either the house or the senate once in six years, and become effective after approval by a majority of the voters and by a two-thirds vote of the succeeding legislature.

Executive officers include the governor, elected by the people for two years and eligible for three consecutive terms; the secretary of state, elected for four years; the comptroller and the treasurer, each elected by the legislature for two years. The state supreme court appoints the attorney general for a term of eight years. In 1923, a reorganization bill was put into effect. Under this act the governor's powers were enlarged, so that he now controls all departments, principally through his increased power of appointment.

Legislative power is vested in the Assembly, consisting of a house of representatives of ninety-nine members, and a senate of thirty-three members. All are elected for two-year terms, and the Assembly meets in odd-numbered years. Clergymen are not eligible.

Judicial decisions are made by a department headed by the supreme court, which is com-

posed of five judges elected for eight years. The civil court of appeals is divided to serve the three divisions of the state: East, Middle, and West Tennessee. Nine judges, three for each division, preside. This arrangement was adopted in 1925 to relieve the supreme court of part of its load of appealed cases. Thirteen chancery courts, nineteen circuit courts, and the county courts each have one judge elected for a term of eight years.

Local Government is carried on through county courts, composed of district magistrates and a presiding judge or chairman. The courts levy taxes, approve budgets, and, in some instances, elect the county superintendent of schools.

National Politics. Tennessee has played an important political role in national affairs. Many statesmen have come from Tennessee, including three presidents, Andrew Jackson, James K. Polk, and Andrew Johnson. Among other Tennesseans who have attained national leadership are: Cordell Hull, Secretary of State under President Franklin D. Roosevelt; James Clark McReynolds, justice of the Supreme court (1914-1940); and Norman H. Davis, diplomat and American Red Cross executive.

Since 1870 Tennessee has voted Democratic in presidential elections, except in 1920 and 1928, when it went Republican. (See **POLITICAL PARTIES** [chart].)

Famous Tennesseans

Many noted persons, native to Tennessee or accomplishing their most important work there, are given separate biographies (see *Biographies*, in the list of related subjects at the end of this article). Others who have achieved state, national, or international fame include:

Campbell, Sir Francis Joseph (1834-1912), born in Franklin County, Tenn. Sightless from boyhood, he became a teacher of music in the Tennessee School for the Blind, and in Perkins Institute for the Blind in Boston. He established the Royal Normal School and Academy for the Blind in London, England, and was knighted by King Edward VII.

Davis, Norman H. (1878-), born in Bedford County, Tennessee. Diplomat and financier, served in World War I as adviser on foreign loans and as the American member of the Armistice Commission to Negotiate Peace. He was a member of the Council of the League of Nations in 1924, and of the Nine Power Conference on Sino-Japanese conflict in 1937. Awarded the Woodrow Wilson medal, 1937, for services in the cause of better international relationships. Appointed chairman of the American Red Cross by Franklin D. Roosevelt, 1938.

Dodge, John W. (1807-1891), born in New York. One of the greatest painters of miniatures of his time, he made portraits of such well-known figures as Andrew Jackson, Henry Clay, Daniel Webster, and John Marshall. He named the little town of Pomona, Tenn., for the Roman goddess of the orchards, bought 5,000 acres of land there, and planted 82,000 apple trees.

Hughes, David Edward (1831-1900), born in London, England. He invented, in 1855, a type-printing telegraph, and later invented several pioneering electrical devices, including a microphone.

Ochs, Adolph (1858-1935), born in Cincinnati, Ohio. Rose from newsboy and printer's apprentice at Knoxville, Tenn., to become owner and publisher of the *Chattanooga Times*. In 1919, he became owner and publisher of the *New York Times*. He made possible the Dictionary of American Biography by donating \$500,000 for preparation of the manuscript. He founded the Chattanooga-Lookout Mountain Park, which is now a part of the National Park System.

Sevier, John (1745-1815), born near New Market, Va. Pioneer, soldier, governor of the State of Franklin, and first governor of Tennessee. He led 240 of his fellow pioneers across the Great Smokies to join in the defeat of the British at Kings' Mountain. At his death, he was surveying the boundaries of the Creek cession in Alabama.

Tate, Allen [John Orley] (1890-), born in Fairfax County, Va. Poet, critic, and essayist. He wrote biographies of Stonewall Jackson, Jefferson Davis, and Robert E. Lee, and collaborated in preparing *I'll Take My Stand*, an important study of the Agrarian Movement in the south.

State Symbols and Events

State Seal. Within the inner circle are a plow, a sheaf of wheat, a cotton plant, and an early freight boat, which symbolize agriculture and commerce.

State Flag. See UNITED STATES OF AMERICA (color plate, Flags of the States).

State Motto. Agriculture and Commerce.

State Bird. Mockingbird. See **BIRDS** (color plate, State Birds).

State Flower. Iris. See **FLOWERS** (color plate, Common Garden Flowers).

State Song. "My Homeland, Tennessee"; words by Nell Grayson Taylor, music by Roy Lamont Smith.

Annual State Events. Among the interesting events in the state which draw visitors to Tennessee from all parts of the nation are:

National Field Trials for Bird Dogs, Grand Junction, first week in February.

Mule Day Festival, Columbia, first Monday in April.

Iris Festival, Nashville, fourth week in April.

Pilgrimage to Bishop Oley's Shrine, Ashwood, on Whitsunday, in May.

Cotton Carnival, Memphis, in May (no fixed date).

Strawberry Festival, Humboldt, in May (no fixed date).

Tennessee State Fair, Nashville, third week in September.

Wild Boar Hunt, Tellico Plains, third week in October.

History

1541 De Soto explored the Tennessee region.

1673 James Needham, Virginian, explored Tennessee River Valley. Joliet and Marquette, Frenchmen, stopped near present site of Memphis.

1682 La Salle established Fort Prudhomme on Mississippi.

1692 French trading post set up near present site of Nashville.

1748 Thomas Walker discovered Cumberland Gap.

1757 Fort Loudoun became westernmost British outpost.

1760 Daniel Boone blazed trail for the Wilderness Road.

1769 First permanent settlement made along the Watauga River.

1772 Articles of Watauga Association adopted.

1780 Fort Nashborough (Nashville) built.

1784 State of Franklin set up.

1796 Tennessee admitted to the Union.

1838 Cherokee Indians removed from Tennessee.

1831 Tennessee seceded from the Union.

1866 Tennessee re-entered the Union.

1873 Uniform public school system established.

1913 State highway improvement begun.



- 1920 Woman's suffrage amendment ratified.
 1933 Tennessee Valley Authority (TVA) created.
 1936 Norris Dam, first unit of TVA, completed.
 1941 Tennessee began the expansion and marshaling of industry and agriculture for World War II.

Indian Days. The early Tennessee Indians included several tribes, the Chickasaw, who lived along the Mississippi River bluffs, and the Cherokee, who were mountaineers; the Muskogean, a branch of the Creek Nation, who lived near the present site of Chattanooga; and the Shawnee, a fierce, wandering band who tried to seize the common hunting grounds of central Tennessee. After many bloody battles between 1650 and 1700, the Shawnee were forced northward to the Ohio River by the other tribes. Many of the Indians were driven off their lands as the white man pressed farther westward. The Cherokees were removed by the Federal Government in 1838, and resettled on the Indian reservations in the Southwest.

Exploration and Settlement. Hernando De Soto crossed the southwest corner of the region in 1541 and planted the flag of Spain beside his camp near the site of the present city of Memphis. More than one hundred years passed before James Needham of Virginia came with a scouting party into the Valley of the Little Tennessee and Tellico rivers. In the same year, 1673, Joliet and Marquette were exploring the Mississippi Valley and visiting the Chickasaw. They claimed this whole region for France. Another Frenchman, La Salle, erected Fort Prudhomme on the Chickasaw Bluffs in 1682, but it soon was abandoned. By 1692, Charles Charleville had established a trading post at French Lick, near the place where Nashborough (later Nashville) was established a century later.

Although three nations—Spain, France, and England—claimed this territory, the English traders and scouts were most successful in dealing with the Indians. By 1755 the British fur trade in the Tennessee territory amounted to one million dollars annually. The Cherokees became staunch friends of the English and fought with them during the French and Indian Wars. Fort Loudoun was built for their protection, and, after the defeat of the French in 1761, it became an important trading post.

Daniel Boone blazed the Wilderness Road in 1769, at the request of Richard Henderson of North Carolina, and these two men opened Kentucky and Tennessee for permanent white settlement. Although the region was considered part of North Carolina, that province neglected the welfare of the people who had come over the mountains. Therefore, in 1772, the settlers formed the Watauga Association, and drafted the first constitution to be written and adopted by independent white Americans.

Territorial Years. After the Declaration of Independence, the Wataugans called their community the District of Washington, one of

the first localities in the United States to so honor George Washington. In 1779, a band of pioneers, led by James Robertson and John Donelson, settled around the salt lick on the Cumberland River, where they built a little fort called Nashborough and began the settlement of Middle Tennessee. They drew up the Cumberland Compact in 1780, by which representative government was established and courts were created.

In 1784 North Carolina ceded what is now Tennessee to the United States, with the provision that the offer be accepted or rejected within two years. As this left the region without state or Federal protection, the inhabitants set up the independent state of Franklin (which see), which was ignored by Congress and abandoned in 1788. Two years later, the present Tennessee was ceded to the United States as the "Territory South of the Ohio," and a steady stream of immigrants began pouring in. These pioneers struggled with Spanish and Indian claimants to the region, but by 1794 most of the hostilities had ceased.

Statehood. On June 1, 1796, Tennessee was admitted to the Union as the sixteenth state. It was the first to be created out of government territory; Kentucky and Vermont, previously admitted, had been formed from territories belonging to individual states.

The history of the state now became in part the story of Andrew Jackson and his leadership. Tennessee troops under Jackson defeated the British at New Orleans in the War of 1812. They won distinction in the Creek and Seminole wars and in the Mexican War (which see).

During the lifetime of Jackson, Tennessee became a leading state in commerce and industry, as well as in the growing of wheat and cotton. As the population grew, improved means of transportation became necessary. The first steamboat landed at Nashville in 1819; in 1830 the state set aside \$150,000 for development of its roads and river transportation.

Because of its cotton-growing, slave-worked plantations, western Tennessee had the same interests as those of the Deep South. Middle Tennessee, with wide wheat fields and grazing lands, was somewhat like the Midwest in character, but its farmers owned slaves and it favored the cause of the South. Eastern Tennessee, with its many small upland farms and few slaves, was strongly antislavery from the earliest days. One of the first abolition papers in the United States was published in 1819, near Jonesboro, and many antislavery societies sprang up in this section. Secession from the Union was voted upon after the War between the States had begun, and the Confederate element won. Tennessee withdrew from the Union on June 8, 1861; it was the last state to secede.

Next to Virginia, Tennessee was the chief battleground of the war, with 454 engagements within its borders. The Union soldiers took Forts Henry and Donelson early in the war. Men of Tennessee fought on both sides in the battles of Shiloh, Murfreesboro, Chattanooga, Lookout Mountain, Missionary Ridge, Franklin, and Nashville. Because of its many Union sympathizers, however, the state was the first to be readmitted to the Union (July 24, 1866), and escaped some of the ravages of corrupt government by northern carpetbaggers (which see).

Hampered by lack of funds and by the destruction of most of its roads and railroads during the war, Tennessee struggled between 1865 and 1900 to regain its agricultural and commercial importance. During the 1870's several plagues and epidemics swept the state; the worst of these was yellow fever, which in 1878 took so many lives that Memphis lost its status as a city and became a village. Memphis did not take a city charter again until 1891. The liquor question became one of fiery interest throughout Tennessee, and state-wide prohibition was established in 1909.

During World War I, nearly 100,000 Tennesseans volunteered for service, and Tennessee's Old Hickory Division helped break the Hindenburg line in the Argonne Forest. For his part in this battle, Sergeant Alvin C. York of Tennessee was cited by General Pershing as the outstanding hero of the American Expeditionary Forces.

In the last year of World War I, the building of Wilson Dam to control the waters at Muscle Shoals (which see) and to build up power for making nitrates for explosives was begun by the Federal Government. In peacetime, the project was turned to the manufacture of fertilizers. Muscle Shoals became a part of the great Tennessee Valley Authority, created in 1933, and one of the most important chapters in the life of Tennessee began. In World War II, the aluminum plants at Alcoa were enlarged, and airplane factories were established near Nashville. Other industries and agricultural production were expanded to meet the demands of a nation at war. R.H.W.

Related Subjects. The reader is referred to:

CITIES

Chattanooga
Knoxville

Memphis
Nashville

BIOGRAPHIES

Barnard, Edward Emerson	Lindsey, Benjamin Barr
Bell, John	Murfree, Mary Noailles
Benton, Thomas Hart	Nielsen, Alice
Crockett, David	Plant, Morton F.
Farragut, David Glasgow	Polk, James Knox
Forrest, Nathan Bedford	Polk, Leonidas
Halliburton, Richard	and (Sarah Childress Polk)
Houston, Sam	Read, Opie (Percival)
Jackson, Andrew	Smith, Edmund Kirby
and (Rachel Roberts Jackson)	Walker, William
Johnson, Andrew	Watterson, Henry
and (Eliza McCordle Johnson)	Williams, John Sharp

HISTORY

Franklin
Indians, American
Ku-Klux Klan
Muscle Shoals
Pioneer Life

Tennessee Valley Authority
Trails of Early Days
War of Secession
(Principal Battles)
Watauga Association

RIVERS AND MOUNTAINS

Cumberland River
Cumberland Mountains

Great Smoky Mountains
Tennessee River

LEADING PRODUCTS

Aluminum
Coal
Corn
Copper
Cotton
Dairy Husbandry

Horse
Iron and Steel
Lumber
Marble
Mule
Pencil

Phosphate
Printing
Rayon
Sulphuric Acid
Tobacco
Zinc

Books for Adults

GARDEN STUDY CLUB OF NASHVILLE. *History of Homes and Gardens of Tennessee*. Parthenon Press, 1936. Early gardens and homes.
HARLOW, ALVIN F., and ENSLOW, ELLA. *Schoolhouse in the Foothills*. Simon and Schuster, 1935. True adventures of a teacher in the Tennessee foothills.
Tennessee: *A Guide to the State*. Viking, 1939. (American Guide series.) The life of the people and the history of the state.
WHITMAN, WILSON. *God's Valley*. Viking, 1939. A witty and popular book on the TVA.

Books for Younger Readers

BOLTON, IVY M. *Tennessee Outpost*. Longmans, 1939. Tennessee under Spanish rule.
JUSTUS, MAY. *House in No-End Hollow*. Doubleday, 1938. How mountain children weave, and make pottery and baskets. *Mr. Songcatcher and Company*. Doubleday, 1940. Folkways, games, and songs of the mountain dwellers.
SIMON, CHARLIE MAY H. *Lonnie's Landing*. Dutton, 1942. Pioneering in the Tennessee wilderness.
SKINNER, CONSTANCE L. *Silent Scot, Frontier Scout*. Macmillan, 1925. Adventures of the Tennessee frontier.

Questions on Tennessee

(An outline suitable for Tennessee will be found with the article "State.")

Why is it said that no inhabitant of Tennessee is ever just a Tennessean?

Where in Tennessee are (a) the largest marble-finishing works in America? (b) the biggest rayon and cellophane factory in the world? (c) the largest aluminum foundry in the world? Why were they located there?

Why is flour made of Tennessee wheat especially suited to use in the tropics?

Where is the "drowned forest" of Tennessee, and how was it submerged?

What are oxbow lakes? Why are many of them found in Tennessee?

How does Tennessee conserve its natural resources?

What part has the Tennessee Valley Authority played in the life of Tennessee and surrounding states? Why are its activities centered in Tennessee?

What are the reasons for the great industrial development of Tennessee?

What part was played in the growth of the state by (a) the rivers? (b) Indian trails?

How have the early handicrafts of Tennessee been preserved?

What contributions has Tennessee made to American music?

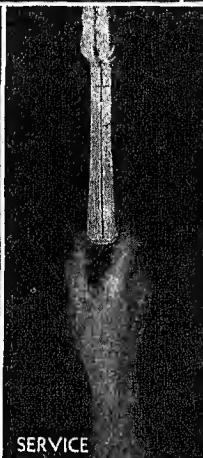
How does Tennessee protect the health and welfare of its people?

What famous statesmen were Tennesseans? What role did each play in the political life of the nation?

What was the role of Tennessee in (a) the War between the States? (b) World War II?



FOREHAND



SERVICE



BACK HAND

Ready Position. Before you can achieve proper strokes, acquire the habit of setting yourself in an alert, balanced stance between shots. Keep your body *alive* by bending your knees, crouching slightly and placing one foot behind the other to be ready for a quick start. Watch your opponent's strokes; anticipate direction and speed of his shots.

The Volley. The secret of a good volley—whether on the forehand (1) or on the backhand (2)—lies in split-second co-ordination of four elements: Never let the racket head drop below the wrist; hold the wrist very firm at contact; take a short, punchlike swing; throw your body weight into the shot. Balls higher than the net should be hit downward with the racket face flat as shown in pictures 1 and 2.

Grips. The way you grip the racket is largely an individual matter, but the principles behind it are illustrated by these three grips. For forehand, shake hands with the racket, placing your wrist behind it for greater power. For service, move your wrist to the top for greater ease of handling. For backhand, slide it over to get it behind the stroke.

High-speed photographs of Leif Nordlie taken in Spalding Research Laboratory—© A. G. Spalding & Bros., reprinted through the courtesy of "Look" Magazine.

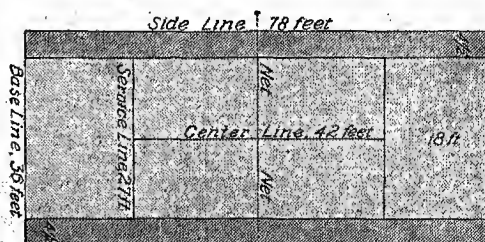
TENNESSEE RIVER, the largest tributary of the Ohio, formed by the meeting of the Holston and the French Broad rivers, about four miles above Knoxville, Tenn. The main stream flows southwestward through Tennessee, enters Alabama at its northeast corner, dips in a great curve, and flows out again at its northwest corner, re-entering Tennessee. It then flows northward through that state and northwest across Kentucky, joining the Ohio at Paducah. Including the Holston and the North Fork of the Holston, it is 900 miles long. The Tennessee alone is 652 miles long. See **MUSCLE SHOALS**; **TENNESSEE** (Rivers, Lakes, and Waterfalls).

TENNESSEE VALLEY AUTHORITY, a Federal corporation created to aid flood control, national defense, navigation, agricultural and commercial expansion, and the development of electric power, in the Tennessee River basin. See **MUSCLE SHOALS**; **TENNESSEE**.

TENNIEL, *ten' yel*, SIR JOHN (1820-1914), an English cartoonist and book illustrator, famed for political cartoons made for *Punch*, and for illustrations of Carroll's *Alice in Wonderland* and *Through the Looking-Glass*. He was born in London, and was practically a self-trained artist. He became cartoonist for *Punch*

in 1850, a position which he retained for half a century. Tenniel's work was admired for its originality, dignity, and excellence of technique.

TENNIS, one of the earliest of ball games, whose origin is unknown. The old game was the basis for the modern game, which in its early modifications was known as *lawn tennis*, and which is now generally called simply *tennis*. The old game of tennis was the popular sport of kings, and is sometimes referred to as



DOUBLES PLAYING COURT

the "royal game." There are still a few of the old tennis courts in existence, but the game has practically given way to the more modern form. It is played on a hard court of grass,

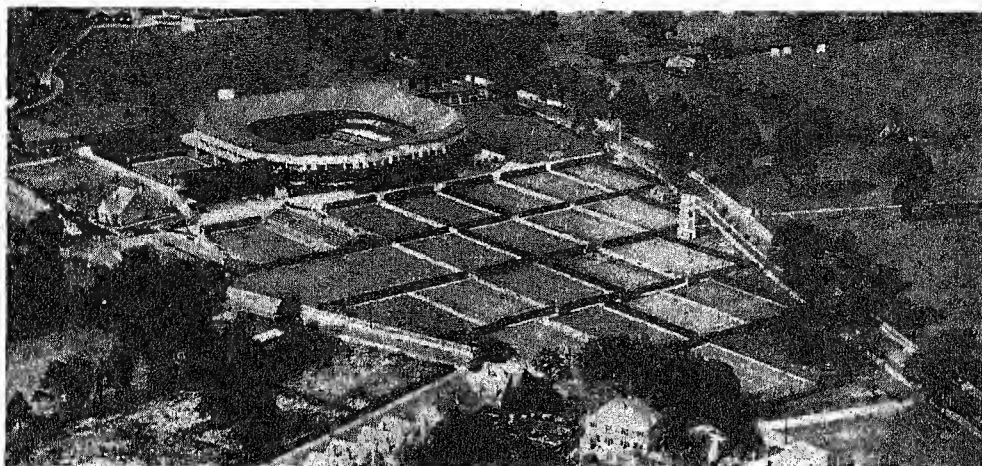


Photo: U & U

TENNIS COURTS AT WIMBLEDON, ENGLAND

The scene of the most important international tournaments in the world of tennis.

gravel, cinders, clay, or asphalt, with balls and rackets. The balls, $2\frac{1}{2}$ inches in diameter, are of rubber, covered with felt. They are usually white, although colored balls have recently been introduced. The rackets, which are 8×15 inches, have frames of ash or hickory, with cedar handles, the frames being netted with tightly strung, varnished gut. Steel frames are also used. The court is 78×27 feet, marked out by white tapes or lime boundaries, with an alley $4\frac{1}{2}$ feet beyond on either side, used only when four people play. A net, three feet high, divides the court into halves. Each side is divided again 21 feet from the net, and the space between this line and the net is bisected into rectangles, called *receiving courts*.

The object of the player who starts the game is to knock the ball with the racket into the opponent's court so that he cannot return it. This player, called the *server*, stands behind the right side of the base line. He serves the ball with an overhead stroke, so that it flies into the receiving court diagonally opposite him. Two balls are allowed for the serve. If both are *faults*, that is, if both fail to land in the receiving court, the server loses and the receiver gains a point. The first ball must be bounced, but other balls may be returned, either on the first bounce or before touching the ground. When one side or the other misses a ball, service begins again from the opposite side of the line, and so on, alternately. At the end of the game, the receiver becomes the server, and the server acts as receiver.

Each ball missed scores the opponent a point. The first point is 15, the second 30, the third 40, and the fourth 50, or *game*. If each player has three points (40), the score is called *deuce*, and two successive points must be made to win the game. The first point after deuce is

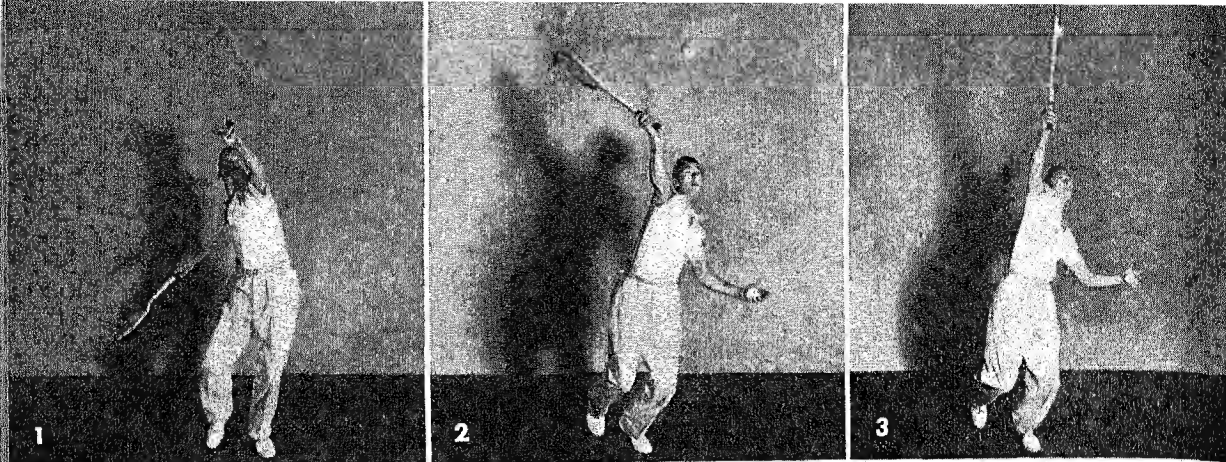
called *advantage* (*ad* or *'vantage*, for brevity); if each has four points, the score returns to deuce. When one side wins all the points before the opposite side has scored any, the round is called a *love game*.

Six games won make a *set*, unless each player has won five games, when two games in succession must be won to complete the set. Three out of five sets must be won to decide a championship.

The modern game of tennis was introduced into the United States in 1875. Popularly received, it early became a major sport. In 1881 the United States Lawn Tennis Association was formed, and a tournament was held in New York, with thirty-three clubs participating. The first national championship match was held the same year at Newport, R. I.

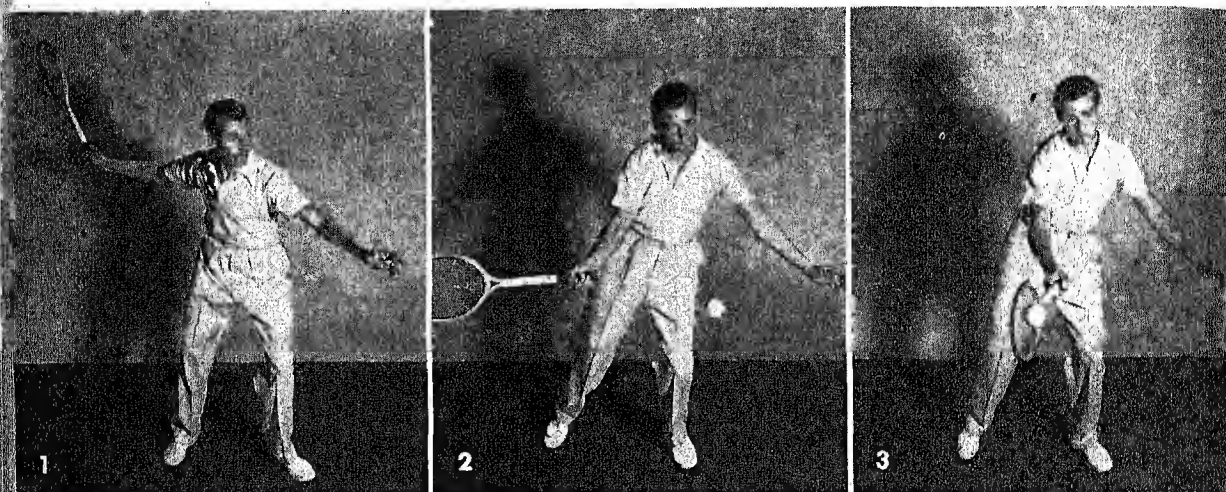
Since 1900, international matches have added interest to the game. In that year, a cup was offered by Dwight F. Davis as a trophy for international competition. The United States won the cup in 1900, 1902, 1913, 1920-1926, 1937, 1938; Great Britain, 1903-1906, 1912, 1933-1936; Australia, 1907-1909, 1911, 1914, 1919, 1939; France, 1927-1932. Competition for the Davis cup is by teams, not individuals. The Wightman cup, established by Mrs. George W. Wightman, in 1923, is a perpetual trophy offered for competition of women in England and America. Matches, consisting of five singles and two doubles, are played annually, one year at Wimbledon, England, and the next at Forest Hills, Long Island. The United States won the cup in 1923, 1926, 1927, 1929, and from 1931 to 1939. All international tournaments were discontinued in 1940 for the duration of World War II. The Wimbledon courts were badly damaged by bombs. See WILLS, HELEN.

L.B.S.



HOW TO PLAY TENNIS

The Serve. There are many proper ways to serve, but most of them are built on certain fundamentals. The start (1) is very important. Face nearly at right angles to the intended line of flight. Toss the ball up carefully so it moves in a line slightly forward of your head and reaches the top of its flight several inches higher than your full reach with the racket. As you do this, swing the racket back past your right leg, then

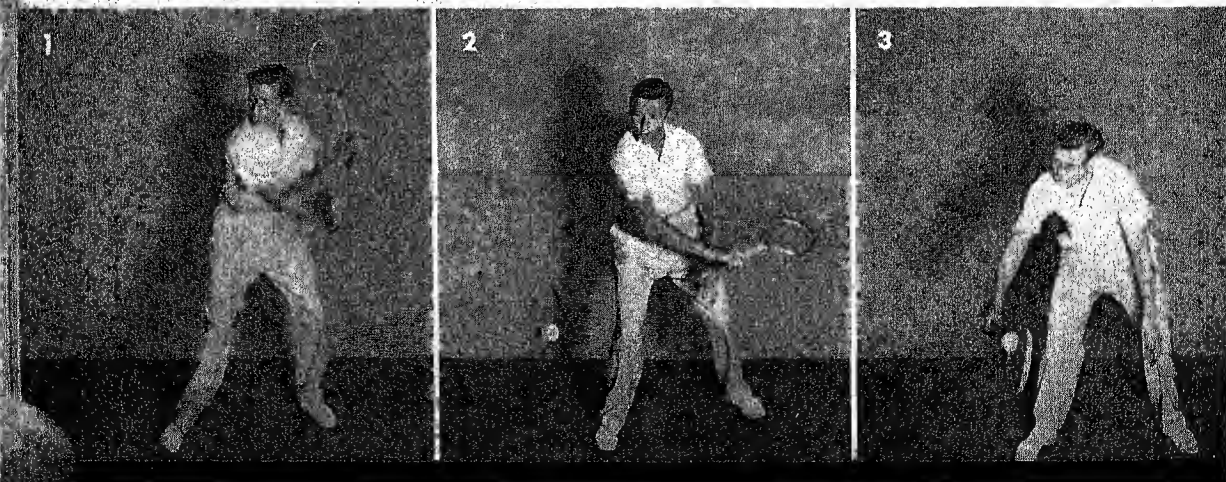


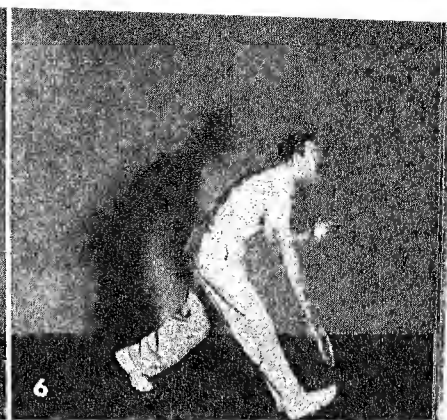
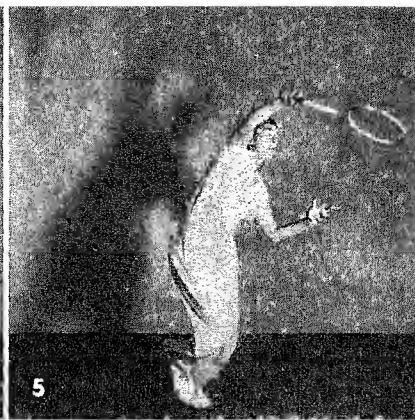
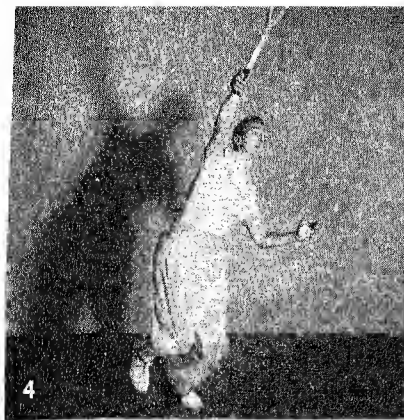
The Forehand. For the average tennis player, the forehand drive is the favorite stroke, offering the best opportunity for speedy shots and placements. To execute it properly, you must begin (1) by placing yourself at right angles to the net with your weight well back on the right foot. The left hand is used for balance. As the ball rises

to the top of its bounce (2), bring the racket forward and shift your weight into the stroke. Impact (3) should take place about opposite the left heel. At this point the wrist and arm should be firm, and the racket should press against the ball in the line of its intended trajectory. The face of the racket should be turning slightly over the ball. The

The Backhand. Tennis players probably suffer more agony from "backhand trouble" than any other part of the game. Yet there is no reason why any player cannot develop a reliable backhand with a little practice. The starting position (1) is even more important than in the forehand. You must be placed with your back slightly toward the net and

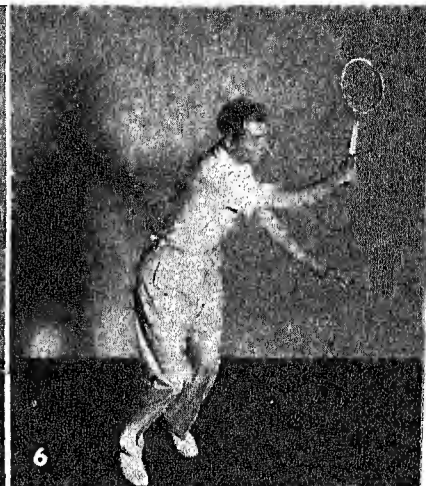
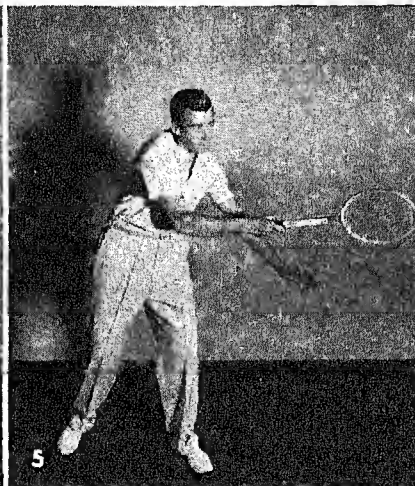
your weight on the left foot. Your right shoulder must be turned back, and your eyes must be fixed on the ball at all times. Be sure to take a full backswing. As you swing up toward the oncoming ball (2), lean into the stroke and turn the racket face over so it is vertical at impact (3). The ball should be met just in front of the right foot; if you let





up behind your head, making it loop to start the forward swing toward the ball (2). Hit the ball at the top of your reach (3). As you hit the ball, shift your weight forward, bracing on the toes of your left foot. The head of the racket moves out over the ball (4 and 5). If you wish to give it

spin, move the racket face sideways across the ball at impact. Finish the stroke with a long follow-through which carries the racket down toward the left, almost touching the ground (6). The free body movement which is essential to a smooth, powerful service is seen in pictures 1 and 6.



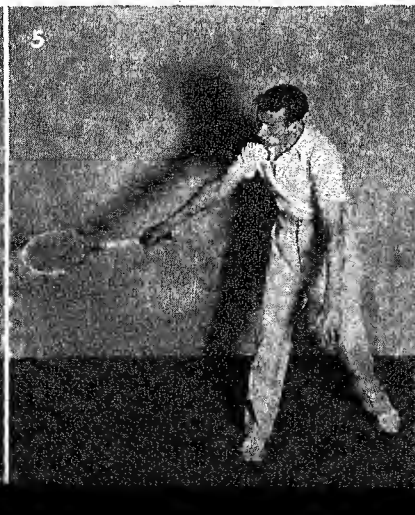
part of the swing after impact is as important as anything that happens earlier. A rough or incomplete follow-through indicates that the stroke has probably been broken at or before impact. Another common fault that ruins "forehands" is dropping the wrist; picture 5 shows how the racket, wrist, and forearm should form a firm, straight line,

it get back any farther, you will lose control. Body movement and swing must be adjusted so you will hit the ball nearly at arm's length from your body; taking them close in cramps the stroke and euts its power. Hold your wrist and arm firm and don't let the ball slip across the racket face. As you swing into the follow-through (4, 5), keep

even some time after impact. As you complete the follow-through (6) you should start immediately for the proper court position to be ready for your opponent's return; remember that, in tennis as in chess and in many other games, points are seldom won by just one move alone.

High-speed photographs of Leif Nordlie taken in Spalding Research Laboratory—© A. G. Spalding & Bros., reprinted through the courtesy of Look Magazine

shifting your body forward onto the right foot and hold the racket along the line to be followed by the ball. Right to the end (6), keep your arm straight; "breaking" your elbow will force the racket head down and destroy your control.



TENNYSON, ALFRED (1809-1892), first Baron of Aldworth and Farringford, one of the great Victorian poets, born on August 6, 1809, was the son of a cultured country rector. In 1815, young Tennyson was sent to the Louth Grammar School, where he remained four years. His father cared for his education from that time on until 1828, when the youth entered Cambridge University. Alfred's environment developed in him a vivid imagination and a love of nature. In 1827, Charles and Alfred Tennyson published *Poems by Two Brothers*. The book attracted no attention, and brought to its authors only about \$100.

Poetry of Student Days. The constantly secluded life at home had made the brothers rather shy, and when they entered the uni-

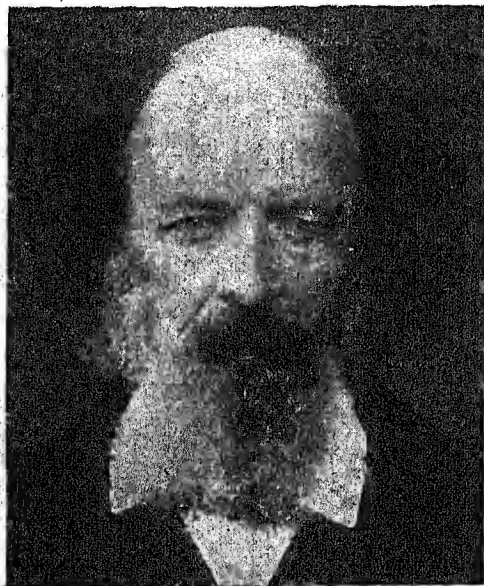


Photo: Brown Bros.

ALFRED TENNYSON

versity, they did not find it easy to make friends. Gradually, however, some of the brightest young men of the school became acquainted with the brothers and made them members of the select society known as "The Apostles." In 1829 Alfred distinguished himself by winning the Chancellor's prize for his blank-verse poem *Timbuctoo*, and in the following year he published his *Poems, Chiefly Lyrical*. Critics found faults in this volume, but recognized, too, the promise of the young author; indeed, the melody of such poems as *Mariana* and *Oriana* could not fail to make itself felt.

Shortly before his father's death, in 1831, Tennyson left Cambridge without receiving a degree. Two years later, he published another book of *Poems*, among which appeared some of the most exquisite of his lyrics, in-

cluding *The Lady of Shalott*, *The Palace of Art*, *The Lotus-Eaters*, *The Dream of Fair Women*, and *Oenone*. Again the critics did not spare his work, and a particularly savage article appeared in the *Quarterly Review*; but had Tennyson written nothing after that time, he would by that volume have proved his right to rank with the great English poets.

His Greatest Years. In 1833 an event occurred which affected the poet so profoundly that he remained in seclusion for ten years. This was the sudden death of his best friend, Arthur Henry Hallam, son of the historian. At the end of the long period of silence appeared a new collection of *Poems*, containing, with others of special note, *Locksley Hall*, *Morte d'Arthur*, *Dora*, *Ulysses*, and *Break, Break, Break*. In 1847 was produced *The Princess*, a long narrative poem which is perhaps most noteworthy for the exquisitely finished songs interspersed through it—*Sweet and Low*; *The Splendor Falls on Casile Walls*; *Tears, Idle Tears*; and *As Through the Land*. This third collection is marked by a depth of thought not found in his earlier writings, but the spiritual development which came as a direct result of Hallam's death found its fullest expression in the long elegy *In Memoriam*, composed of lyrics written at various times, but published as one poem in 1850. This masterpiece is equalled in its class only by Milton's *Lycidas* and Shelley's *Adonais*. Much longer than either, it presents all phases of the poet's grief, and takes up the most serious questions as to life, death, and immortality.

Appointment as Poet Laureate. In the same year, Tennyson was made poet laureate. He was then enabled to purchase the estate of Farringford, on the Isle of Wight. Five months before he received this honor, he had married Miss Emily Sellwood, to whom he had been long betrothed. Years later, the poet said of her, "The peace of God came into my life before the altar when I wedded her." In 1867 Tennyson built Aldworth, his house near Haslemere, and thereafter passed his time between the new home and Farringford. Eight years before his death, he was made Baron of Aldworth and Farringford.

After his appointment to the laureateship, he produced *Maud*, a dramatic representation of a morbid man; *The Idylls of the King*, an idealistic treatment of the King Arthur legends, and perhaps his most popular work; *Enoch Arden*, portraying one of the noblest heroes in literature; the dramas *Queen Mary* and *Becket*; *Locksley Hall Sixty Years After*; *Demeter*; and several other volumes of poems and dramas. The Arthurian legends always had a fascination for him, and before his use of them in the *Idylls*, he had touched on them in such poems as *The Lady of Shalott* and *Sir Galahad*. The *Death of Oenone* appeared after he died.

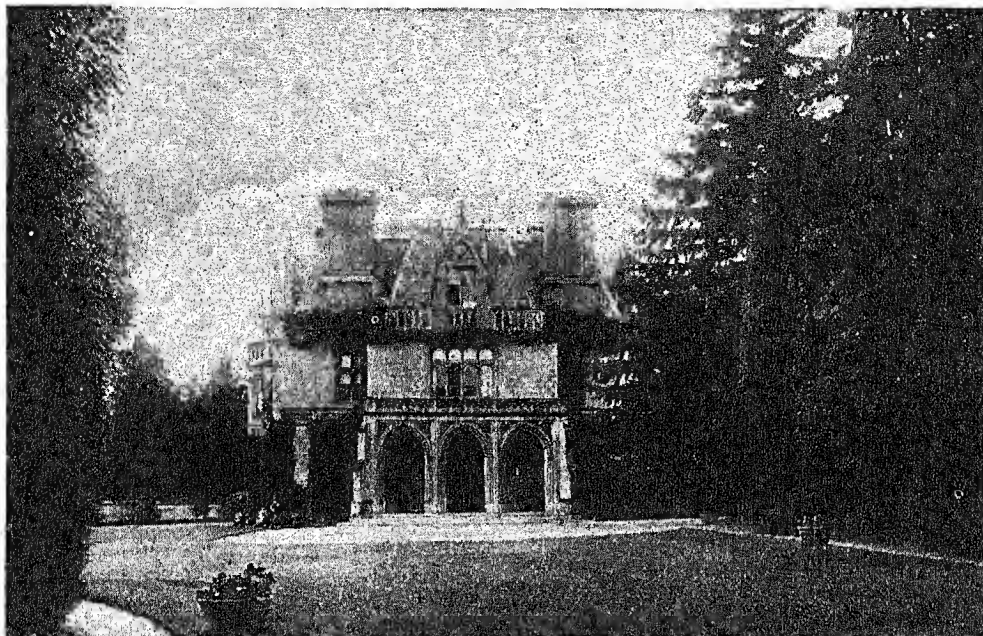


Photo: Frith

ALDWORTH, TENNYSON'S HOME

Estimate of His Work. Melody is perhaps the most notable characteristic of Tennyson's verse. At the outset, it was sometimes secured at the expense of thought—the little lyric *Where Claribel Low Lieth*, for instance, is almost pure music without an idea. Later, however, he sought to unite thought and melody, and his ability to make sound fit sense is shown clearly in such contrasting lines as the following, from the *Passing of Arthur*. Those of the first group are rugged and harsh, and appropriate to the scene they describe; those of the second are smooth, flowing, beautiful:

The bare, black cliff clang'd round him, as he based
His feet on juts of slippery crag, that rang,
Sharp-smitten with the dint of armed heels.
And on a sudden, lol the level lake,
And the long glories of the winter moon.

The music of his verse was but an expression of the love for harmony which was one of his strongest characteristics; and he was keenly sensitive to the suffering which he saw in the world. He has been called the poet of science. Evolution has a large place in his writings. Tennyson was buried in Westminster Abbey.

See also ARTHUR, KING; GALAHAD, SIR; IDYLLS OF THE KING.

TENOCHTITLÁN, *tay nohch teet lahn'*. See AZTEC; MEXICO (Spanish Conquest); MEXICO CITY.

TENPINS. See BOWLING.

TENSE, a word derived from the Latin *tempus*, meaning *time*, and used in grammar to denote the forms which a verb may take to tell the time when an action occurs. Tense is indicated by changes in the forms of verbs and by auxiliary words, as shown below.

Tense Forms of the Indicative. There are three simple tense divisions in the indicative mode—present, past, and future—which indicate the time *now*, *past* time, and time *to come*. However, in each case the act may be viewed as completed at some definite time in the present, past, or future. Hence there are also three *perfect* tenses, denoting *perfected* action or state. The following table gives these six tenses:

Present	I am, do, see, walk
Past	I was, did, saw, walked
Future	I shall be, do, see, walk
Present Perfect	I have been, done, seen, walked
Past Perfect	I had been, done, seen, walked
Future Perfect	I shall have been, done, seen, walked

Action in the present, past, and future may also be represented as continuing, or in progress, and is then expressed thus:

I am doing, seeing, walking
I was doing, seeing, walking
I shall be doing, seeing, walking

The perfect tenses likewise have a form which shows that the action is continuous—

I have been doing, seeing, walking
I had been doing, seeing, walking
I shall have been doing, seeing, walking

Transitive verbs, like *to see*, may be conjugated in all tenses, in both the active and the passive voices. The passive forms are *I am seen, I was seen, I shall be seen, I am being seen*, etc. [For a discussion of voice, see VOICE; VERB (Properties of Verbs.)]

Past and Present Perfect. These two tense forms are sometimes confused. The distinction between them is this: Whereas the past tense expresses action merely as belonging to past time, the present perfect expresses action as belonging to past time, but also as touching the present. It is correct to say, *The Japanese have made rapid progress within the last decade*; also, *The Japanese made rapid progress during the last half of the nineteenth century*. In the first case, the action is viewed as coming up to the present; in the second case, simply as taking place in past time. It is incorrect, on the other hand, to make such statements as, *I have left school five years ago*, or *I wrote a letter in the past half hour*. The correct forms are, *I left school five years ago*; and, *I have written a letter in the past half hour*.

Past and Past Perfect. Compare the following: *Washington was first inaugurated in 1789*; *Washington had already been inaugurated when the first national census was taken*. In the first sentence, there is a simple statement of action in past time, and in the second a statement of an act completed before some other specified act.

The Future Tenses. The simple future tense denotes an action that will take place at one time in the future, while the future perfect views an action as one that will be completed before the occurrence of some other future act. The distinction may be seen in the following: *I shall leave to-morrow at ten o'clock*; *I shall have left to-morrow before they arrive*.

Modern usage is tending to eliminate the use of the future perfect, where the simple future may be substituted without loss of meaning. Thus, instead of *I shall have left to-morrow before they arrive*, one could use, *I shall leave to-morrow before they arrive*, to express the same thought.

Shall and Will. Most grammarians make the following distinction between *shall* and *will*, two auxiliary verbs used in forming the future tenses of the indicative: When used with the first person, both singular and plural, *shall* denotes simple futurity; when used with the second and third persons, it denotes command or necessity. *Will* in the first person, singular and plural, denotes purpose or intention; and in the second and third persons, simple future action. These meanings are compared in the following:

SIMPLE FUTURITY	COMMAND, NECESSITY, OR INTENTION
I shall see you again	I will not apologize
You will know by to-morrow	You shall obey
He will arrive to-day	He shall make amends

The distinctions between these auxiliary verbs are not adhered to so strictly as they once were, and *will* is used in place of *shall* in much written and spoken English. However, the main distinctions are observed by careful writers and those who speak good English.

Other Modes. For tenses of the subjunctive and imperative modes, see **MODE**.

The Infinitive. The infinitive has but two tenses—the present and perfect. The forms for both voices are as follows:

Present—to love, to be loved
Perfect—to have loved, to have been loved

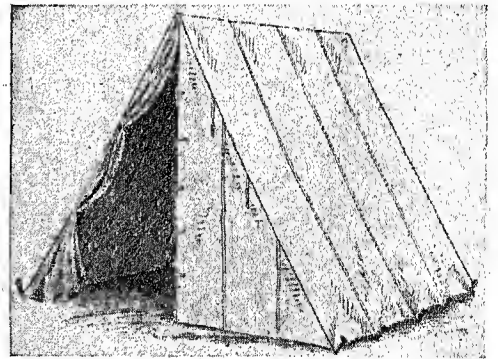
It must be admitted that in many cases the grammatical tense names do not actually indicate the time expressed by verb forms. For example, besides the simple present meaning of the present tense, that form may indicate present, past, or future in actual time. In historical narrative, the present tense is frequently used, especially to describe a scene, although all of the action may have occurred in past time. It may express a universal truth, such as *The earth revolves around the sun*; or it may express habitual action, such as *He goes to the bank every day*. It may express future time, as in *She is going next week*. Because of this fact, some attempts have been made toward a revision of the grammatical forms to fit current usage, but formal grammar still employs the established tense forms.

TENSILE STRENGTH. See **TENACITY**.

TENSILE STRESS. See **STRENGTH OF MATERIALS**.

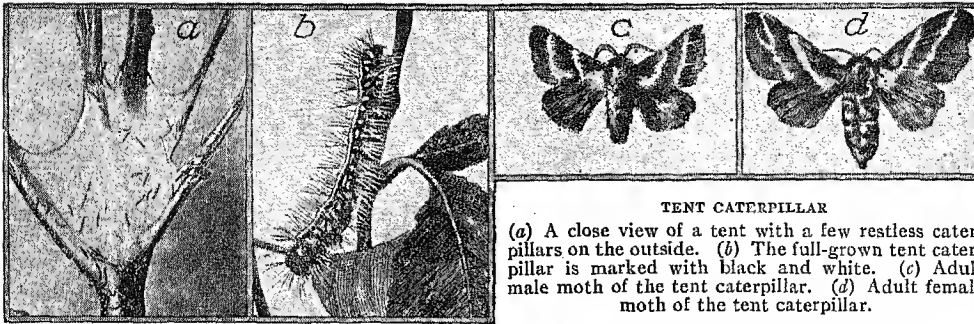
TENSKWATAWA, *tenz kwa' tah wah*, called "the Prophet," brother of the Indian chief Tecumseh (which see).

TENT, a portable dwelling place, usually made of canvas. It is thought that tents are of Eastern origin, having been introduced into Spain by Mohammedan invaders, and from



AN "A" TENT

there spreading over Europe and later to America. The native Indians of North America made wigwams, tepees, or tents of bark and the skins of animals, probably long before white men set foot on the American continent. In many parts of Canada and the Northern United States, the Indians still make these somewhat primitive dwellings, but, for the most part, they have either learned to build



TENT CATERPILLAR

(a) A close view of a tent with a few restless caterpillars on the outside. (b) The full-grown tent caterpillar is marked with black and white. (c) Adult male moth of the tent caterpillar. (d) Adult female moth of the tent caterpillar.

houses or have adopted the modern canvas tent of the white man.

Various Forms. The simplest form of canvas tent follows the pattern of the Indian tepee; it is circular at the bottom, and rises to a point in the center. The modern name for this tent is the *bell*, as it is bell-like in shape. This tent is used by nearly all armies and campers throughout the world. It is set up with a pole in the center, over which the tent is spread, pegs being driven into the ground at proper distances, to which to attach ropes to keep the tent in position. The "A" tent (in the illustration) is equally simple in construction, and may be stretched over a ridgepole running from two upright poles and pegged down to the ground. The *wall tent* is the "A" tent with perpendicular walls to the height of two or three feet, with the gable above, and is similarly erected and held in position. The wall tent has the advantage of giving more headroom than either the "A" or the "bell" tent.

A *marquee* is a large form of tent, chiefly devoted to show and social usages, and to field hospitals with an army. The tents used by armies in peace times are quite different from those carried in war. In fact, the carrying of tents has in most armies been abandoned, except for what are called light "shelter tents," carried by each man. Modern war conditions do not allow of excess of weight in transport, and were full tent accommodations to be carried, it would necessitate the employment of at least double the usual number of vehicles and animals for transport. Tents, in active service, have therefore given place to various temporary shelters. In the World War, dugouts many feet below the surface of the earth sheltered many of the fighters of all armies.

Among the Nomads. In the pastoral districts of Asia, the main population has always lived in tents, and the rank and riches of the members of the various tribes are indicated by marks and symbols on their tents. The tents of Kedar, really Arabian tents of black goats' hair, gave rise to the Eastern expression "black as the tents of Kedar." Even in modern times, the nomadic Arab tribes carry with them their tents, and their homes are just where fancy or

advantage may lead them to "pitch their tents." The tents of the East, however, are more elaborate than the military and camping-out tents of the West, being often divided into apartments, the partitions being of rugs and skins that, according to Western values, are almost priceless.

Suggestions to Campers. For campers, the procuring of a suitable tent is a simple matter. The choice is wide, and tent materials have been greatly improved within recent years. For ordinary purposes, the "bell" or "A" tent will be found most suitable. It is in the choice of locality and in the actual erection of the tent that experience is necessary. One of the simplest precautions is often neglected by camping parties. That precaution is to avoid touching the sides or top of the tent during storms. The drip of water through the canvas will not occur if the material is not touched from the inside, and if the roof is kept free from leaves.

The digging of a trench around the tent is often regarded as unnecessary, yet neglect of this precaution may lead to flood conditions. The trench, to draw water off, built with due regard to the slope of the ground on which the tent is pitched, should be regarded as essential. Disasters would be less frequent if campers would apply good judgment, and a few minutes' work daily, to securing comfortable and hygienic surroundings.

Related Subject. In this connection, there will be found valuable material in the article *CAMP*.

TENTACLES. See *COELENTERATA*; *HYDRA*.

TENT CATERPILLAR. The name applied to the larvae of certain species of moths, with reference to the tent-shaped white webs that the caterpillars spin as nests for themselves. They are voracious eaters of foliage, and do much damage to forest and orchard trees. A destructive species attacking fruit trees is the *apple-tree tent caterpillar*, common in the states east of the Rocky Mountains. Another species of the Eastern states is the *forest tent caterpillar*. Two others are common on the Pacific coast, one found upon oak trees in spring, and the other upon fruit trees in late summer.

The moths of the apple-tree species are a dull reddish-brown, with two oblique, pale stripes on the forewings. In July the female moths lay their eggs in clusters or belts, on the branches of the apple and the wild cherry. In the early spring, the caterpillars eat their way out, and spin their tentlike canopies in the crotch of a branch. The full-grown caterpillar has a blackish skin, with white stripes along the back, and blue and yellow spots. It is covered with yellow hairs.

So ravenous are their appetites, that the occupants of a single tent may eat 12,000 young leaves. The caterpillars file out to feed in the middle of the morning and again in the afternoon; hence, effectively to exterminate them, the webs should be destroyed in the early morning or evening, when the occupants are at home. The nests may be cut off and burned, or destroyed on the trees with a torch. Lead arsenate is an effective spray against the caterpillars. In June the caterpillars scatter in all directions, to spin their cocoons in some protected cranny in fences and buildings. Within these silvery sacs they change to pupae, and in two or three weeks emerge as moths, to repeat the life history of the species.

The moths of the forest tent caterpillar, or forest army worm, are lighter in color than the ones described above, and have dark lines on their forewings, and a row of light dots down the middle of the back. Their tents are less conspicuous, and their egg belts are more nearly circular. W.J.S.

Scientific Names. Tent caterpillars are the larvae of moths belonging to the family *Lasiocampidae*. The apple-tree species is known as *Clisiocampa americana*.

TEN THOUSAND, RETREAT OF THE. See XENOPHON.

TENURE OF OFFICE ACT, the name given to two acts of the United States Congress, which limited the President's power of removal of officers whom he had appointed. The first of these acts was passed in 1820; it limited the term of a large number of appointive officers to four years, and is therefore said to have laid the foundation for the introduction of the "spoils system" [see CIVIL SERVICE (Civil Service Reform)].

More generally known is the act of 1867, which Congress passed over the veto of President Andrew Johnson. From the foundation of the government, it had been the custom to allow the President to dismiss, at his pleasure, any officers appointed by him. As he was responsible for the acts of his subordinates, no authority had interfered in behalf of dismissed officials. Shortly after Johnson's inauguration, however, Congress began to indicate its disapproval of the President's policy, and there was soon open discord between them on questions of reconstruction.

Lest Johnson should exercise his powers of removal and perhaps thwart the Congressional plan of reconstruction, Congress passed the Tenure of Office Act, which required the Senate's consent to the dismissal of any official whose appointment originally had required its consent.

The law was a startling innovation in American government. Johnson ignored it in 1868, when he removed Edwin M. Stanton from the office of Secretary of War; this was one of the causes of the President's impeachment. The law was understood to be an emergency measure; during Grant's administration, it was modified, and in 1887 it was repealed. See JOHNSON, ANDREW (Administration).

TEÓDORO, RIO. See BRAZIL (Rivers and Transportation).

TEOSINTE, *te o sin' te*. See CORN (Name and History).

TEPEE. See INDIANS, AMERICAN (The Early Indians in the United States and Canada: Architecture).

TERBIUM. See CHEMISTRY (The Elements).

TERCEIRA, *tehr sa' rah*, ISLAND. See AZORES.

TEREDO, *te re' do*, a shipworm; also, the genus of mollusks which contains the typical shipworms. The most important of these is the marine borer *Teredo navalis*, found almost all over the world.

The teredo has a long, wormlike, grayish-white body with a small foot and shell valves, and highly developed united siphons, protected by a calcareous tube. It burrows in submerged wood, and is especially destructive to wharfs, piers, and wooden ships.

This voracious mollusk chews its way into the wood, eating the debris, and lining its tunnel with lime. A two-forked tail extends hairlike ends to the outside world. One is used to draw in sea water and minute sea life as food; the other serves as a vessel of excretion. The largest teredo may attain a length of six feet, and bores by rocking its head, growing a new set of teeth as the old ones wear out. The teredo is so fragile that it can hardly be handled, and yet it is sturdy and persistent enough to honeycomb the toughest woods. In three years, it did \$5,000,000 worth of damage at Boston harbor; in four years, \$25,000,000 worth at San Francisco.

TEREK, *tya' rek*, RIVER, a stream flowing into the Caspian Sea (which see).

TERENCE (PUBLIUS TERENTIUS AFR) (about 190-about 159 B.C.), a Latin playwright, born at Carthage. The date and the place of his birth have been the subject of much dispute, but he is said to have been carried to Rome as a slave, and educated there by a Roman Senator. His first play was *Andria*, an immediate success, which gained for him

admission into the best Roman society. His chief literary sources were the comedies of Menander and Apollodorus, which he freely translated and adapted. After bringing out six plays, he sailed for Greece, but never returned from the voyage; accounts vary greatly as to the manner of his death.

During his brief life, Terence succeeded in winning an enduring reputation, though he was in no way an original writer. His ideal was artistic perfection, and the chief merit of his work is the perfect picture he has given of Greek life in the third century B.C., for his writings reflect little of the spirit of his own age and country. Plautus excels Terence in comic power, but not in tenderness, wit, and character drawing. Most Latin students in college courses read at least one of Terence's works.

His Writings. His six extant comedies, probably representing all he ever wrote, are *Andria*, *Hecyra*, *Heautontimorumenos*, *Eunuchus*, *Phormio*, and *Adelphoe*. W.L.C.

TERESA, *te re' sah*, a variant of Theresa. See **TERESA**, SAINT.

TERHUNE, *tur hune'*, ALBERT PAYSON (1872-1942), American writer best known for his stories about dogs, born in Newark, N. J. After being graduated from Columbia, he traveled through Syria and Egypt, living with desert tribes and studying leper colonies. In 1894 he became affiliated with the New York *Evening World*. His writings include *Syria from the Saddle*; *Dr. Dale* (with his mother, Mary Virginia Terhune); a libretto of *Nero* (with William C. de Mille); *Caleb Conover, Railroader*; *Raegan Stories*; *Lad: A Dog*; *Black Gold*; *Further Adventures of Lad*; *My Friend, The Dog*; *Gray Dawn*; *The Luck of the Laird*; *Lad of Sunnybank*; *To the Best of My Memory* (an autobiography); *A Book of Famous Dogs*; *Grudge Mountain*; motion-picture plays; and articles.

TERHUNE, MARY VIRGINIA (1830-1922), an American novelist and writer on domestic science, better known as MARION HARLAND. She was born in Amelia County, Va., and began early to write for publication. In 1856 she was married to the Reverend Edward Payson Terhune. Her first novel, *Alone*, appeared when she was twenty-three. In collaboration with her son (see above), she wrote *Dr. Dale*, a novel. Other stories include *Husks*, *Sunnybank*, *At Last*, *Judith*, *A Gallant Fight*, *When Grand-mamma Was New*, *The Distractions of Martha*, *Where Ghosts Walk*, *Marion Harland's Autobiography*, *Everyday Etiquette*, *A Long Lane*, and *The Carringtons of High Hill*.

TERMINAL MORaine. See **GLACIAL EPOCH**; **MORaine**.

TERMITES, *tur' mites*, the common name of an order of insects popularly known as *white ants*; for they live in communities and



Photo: Visual Education Service

TERMITES' NEST IN AFRICA

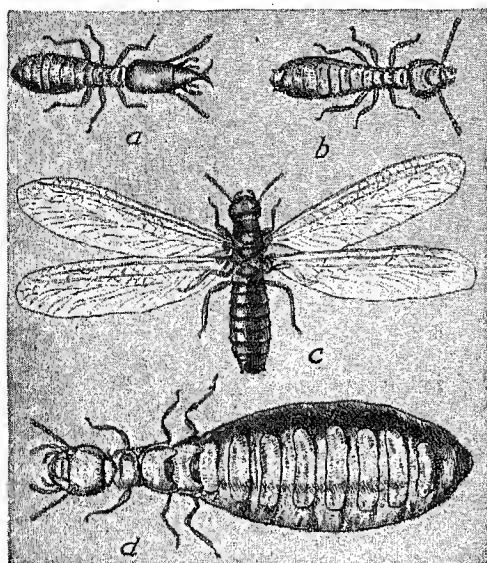
This Congo River nest looks like a dead tree trunk.

have somewhat the appearance of ants. Ants and termites, however, differ from each other structurally in important details. Termites constitute the order *Isoptera* (equal-winged insects). Ants belong to the order *Hymenoptera* (membrane-winged). See **INSECT**.

Termites are found most abundantly in warm regions, notably in Africa, Australia, and the Amazon regions. Some species build huge mounds, made of bits of soil mixed with saliva. These nests are sometimes fifteen feet in height. The dome-shaped interior is divided into numerous chambers and galleries, and in the center is a closed-in cell, where the king and queen are kept as prisoners. This royal pair constitute the perfect male and female of each colony. When they first hatch from the eggs, they have long, membranous wings, but after one flight into the air, during which the mating takes place, the wings break off at the base, and thereafter the pair are held as captives. In the cell, the female undergoes an extraordinary transformation; for her body swells until it is large enough to hold many thousand eggs. As one zoölogist has expressed it, she becomes a "loathsome cylindrical package, two or three inches long, in shape like a sausage, and as white as a bolster."

The eggs, deposited at the rate of several thousand a day, are borne away by the blind, wingless workers, which carry them to specially constructed cells and care for the larvae (young) as they are hatched. The workers make clay tunnels along the trunks and branches of trees, bringing back, through them, gums and decaying wood to feed the entire colony, and to them also falls the task of building and enlarging the

nest. Another wingless class, the soldiers, have large heads and mandibles. They are supposed to defend the mound from attack. Soldiers, workers, and king and queen develop from the same eggs, but scientists believe that



TERMITES

(a) Soldier; (b) worker; (c) adult male; (d) queen.

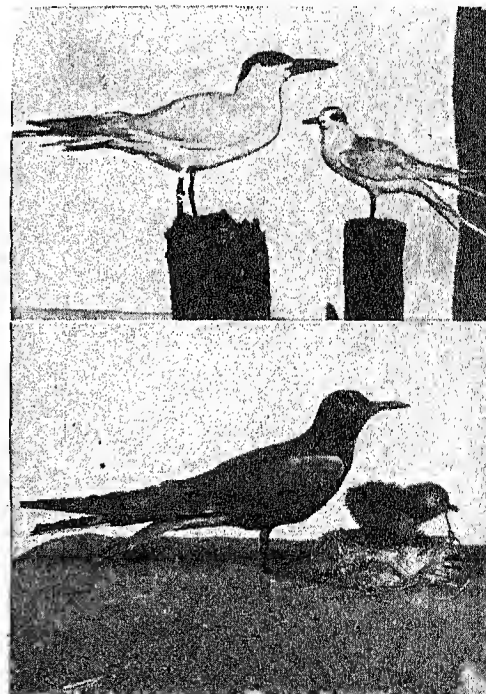
the differences in structure result from the kind of food given the larvae. Termites feed on wood, paper, and other forms of cellulose, and are very destructive in their efforts to find their food, for they tunnel their way through the woodwork of houses, destroy books and furniture, and do great damage to sugar cane and orange trees. In tropical forests, where these insects are found in large numbers, railroad-builders are forced to import cast-iron or steel at great expense, since they cannot use wooden ties. About 1,200 species are known, of which Europe has but two.

A few species of termites are known in the United States, and though they do not build large mound nests, they do considerable damage by tunneling through fence posts, trees, timbers of wooden buildings, bridges, trestles, and other structures. In houses they attack cloth, books, and paper. The United States Department of Agriculture recommends the use of stone, brick, or concrete for foundations of bridges and trestles, and for support posts of buildings. Where timber has to be used, it should be treated with insecticide. Most termites cannot live without water, and cutting off the supply of moisture is effective. W.J.S.

Scientific Name. Termites include families *Colo-termitidae* (common in the South and West), *Termitidae*, *Rhinotermitidae*, *Hadotermitidae*. *Reticulitermes flavipes* is common in our northern states.

TERNS, *turnz*, a subfamily of sea birds related to the gulls and distinguished for their powers of flight. The fifty or more species are found in all parts of the world, ten being native to North America. They are commonly seen on seacoasts and along rivers and lakes, rather than in the open sea. Terns have long, pointed bills, webbed feet, and strong, large, pointed wings, which carry them through the air swiftly and for long distances. The swift, graceful flight has given them the name *sea swallow*. They seize their prey, which consists of small fish, by darting quickly into the water, bill pointing downward. Gulls (which see) pick their food from the surface of the water. Great colonies of terns may be found on islands during the nesting season. The nests are usually placed in depressions in the ground, but sometimes the eggs are laid on the bare rock.

The largest species is the *Caspian tern*, a handsome bird nearly two feet long, with a crest of shining black, and pearl-gray back and wings. The smallest is the *least tern*, nine inches long. The beautiful *common tern*, once



Photos: Visual Education Service

THREE OF THE TERNS

Above, left to right, Caspian and Forrester's terns; below, the common black tern, with nest, egg, and young.

abundant on the Atlantic coast of North America, was almost exterminated by egg- and plume-hunters, but is now protected by law, and is again increasing in numbers. This bird

has light, pearl-gray plumage, with white tail and throat. It is about fifteen inches in length. Its eggs are three or four in number, varying in color from whitish to brownish, thickly spotted with brown and lavender. The species most frequently seen on marshes and lakes of the interior is the *black tern*. Other species are the *gull-billed*, *royal*, *sooty*, *love*, and *Arctic* terns. The last-named has the longest migratory flight of any bird known, traveling 22,000 miles in a year, from the Arctic Circle to the Antarctic Circle, and back again.

D.L.

Scientific Names. Terns constitute the subfamily *Sterninae* of the family *Laridae*. Most of them belong to the genus *Sterna*.

TERPSICHORE, *terp sik' o re*, one of the nine Muses, the patron of dancing, which she is said to have originated. She is represented as a laurel-crowned virgin holding a musical instrument in her hand. See **MUSES**.

TERRA, in mythology. See **TITANS**.

TERRA COTTA, an Italian term for a hard, durable, and attractive form of earthenware, made from clay of superior quality, and used in making architectural decorations, tiles, pottery, garden vases, flowerpots, monuments, fountains, mantels, chimney pieces, and similar objects. It may be produced in almost any color, but is frequently a warm shade of red or a rich cream color. Often, in the manufacture of terra cotta, clays from a number of different beds are secured. The material is weathered, ground, mixed with water, and with sand, pulverized fire brick, or other vitrifying substance, tempered, and then molded into the desired forms. The pieces, after being partially dried, are worked over by the finisher, and are then baked in large kilns. When a particular pattern is to be used several times, a model of the design is made, and a mold is taken, into which the plastic material is forced by hand.

In some large cities, the fronts of tall buildings are occasionally covered with white glazed terra cotta; such a surfacing has the advantage of being easily kept clean. Two of the largest office buildings in Chicago—the Wrigley and the Carbide and Carbon—are surfaced with terra cotta. The former is white, the latter a dark green. Yet, notwithstanding the comparative cheapness of this substance as a building material, and its durability, lightness, and resistance to heat, terra cotta is not so generally used in architecture as stone, marble, brick, and granite, and its possibilities have yet to be thoroughly tested.

Among the ancients, terra cotta was very extensively used. The Greeks and Romans employed it in making roof tiles, gutters, house ornaments, statues and statuettes, vases, tombs and coffins, imitations of metal jewelry, pot-

ters' and sculptors' molds, and numerous other objects, and it also had an important place in mural decorations in relief. In Italy, in the Middle Ages, there flourished a school of terra cotta sculpture, founded by a member of the Della Robbia family (see **ROBBIA, DELLA**). There are valuable collections of Greek and Roman terra cottas in the Louvre, the British Museum, and other museums of Europe.

TERRAPIN, *tehr' ah pin*. See **TURTLE**, subhead; **MARYLAND** (Fisheries).

TERRARIUM, *teh ra' ri h um*. See **NATURE STUDY**.

TERRE HAUTE, *tehr e hoh't*, IND., the county seat of Vigo County, is situated on the Wabash River, about ten miles from the Illinois state line. Indianapolis is seventy-two miles northeast, Chicago is 178 miles north, and Saint Louis is 163 miles southwest. The name of the city, which is the French for *high ground*, refers to its situation on a high plateau on the east side of the river. It was incorporated as a town in 1816, and as a city in 1838. It is one of the oldest settlements in the state. Population, 62,693 (1940).

A feature of historical interest is Fort Harrison, with its beautiful grounds, located on the Wabash River. It was built in 1810-1811 by order of Governor William Henry Harrison, who later became ninth President of the United States, and it was under the command of Captain Zachary Taylor in 1812 [see **HARRISON, WILLIAM HENRY** (Governor of Indiana Territory)].

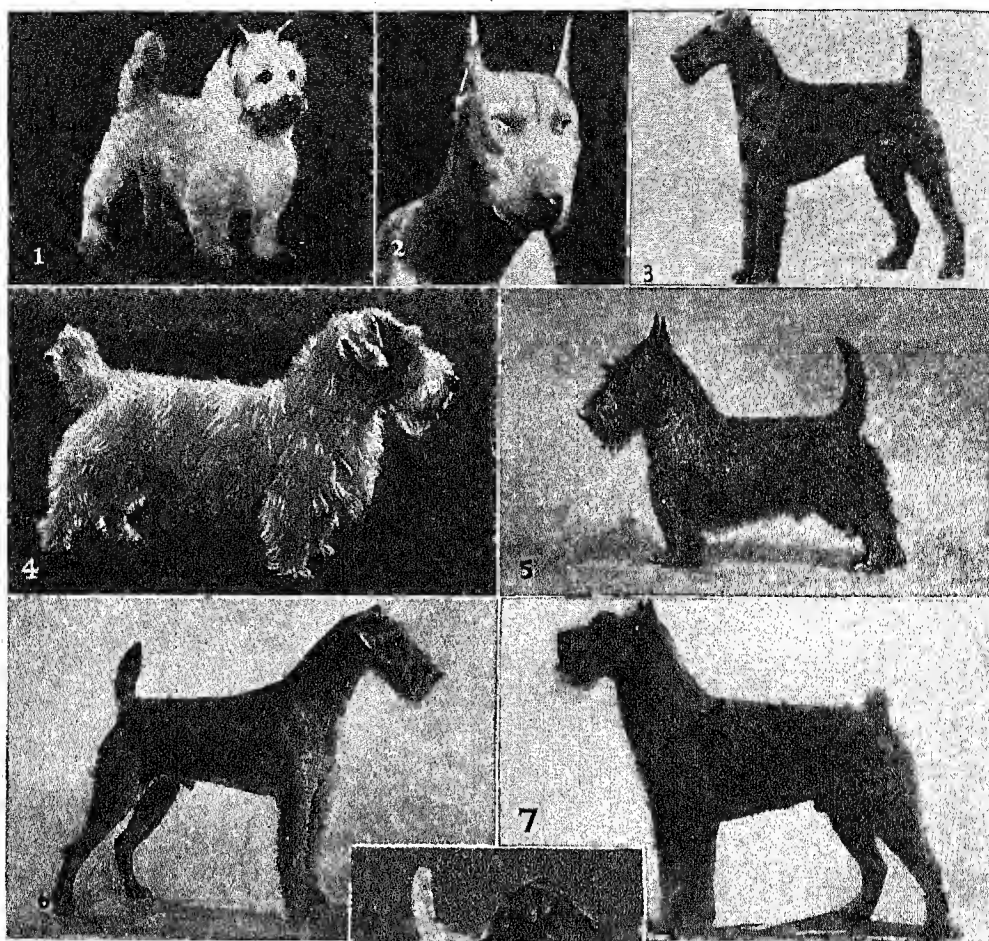
Transportation. Railway transportation is provided by the Pennsylvania, the New York Central (Big Four), the Chicago & Eastern Illinois, and the Chicago, Milwaukee, Saint Paul & Pacific railroads. Motorbus lines extend in all directions.

Industries. Terre Haute is located in a region of an almost inexhaustible supply of bituminous coal, and amid immense hills of shale and clay. Among the most important of the diversified industries are distilling, brewing and food packing. There are also an enameling and stamping plant and various glass works. Total industries number about 130.

Institutions. Among institutions of higher education, in or near the city, are the Indiana State Teachers' College, Rose Polytechnic Institute, and Saint Mary's-of-the-Woods College. A World War Memorial Stadium was built in 1924 in one of the sixteen parks, totaling in area 538 acres. M.F.H.

TERRES MAUVAISES. See **BAD LANDS**.

TERRIER, the general name of at least eighteen breeds of dogs originally bred and trained to drive foxes from their holes, or to dig out and kill still smaller animals, such as rats and mice. The name is taken from the Latin *terra*, meaning *earth*, and refers to their method of hunting. Such work demands strength, activity, grit, and a very durable coat. The chief characteristics of terriers are gameness and grit; they appear to be absolutely fearless, yet are particularly affectionate and faithful.



SOME OF
(1) Cairn. (2) English Bull. (3) Airedale. (4) Sealyham.

The fox and Scottish terriers are among the most popular varieties. The bull terrier, descended from the old English white terrier and bulldog, is an agreeable companion, and, while it possesses all the courage of the bulldog, it has more intelligence and vigor. It makes an excellent watch dog, being faithful and slow to make friends.

The popular Airedale came into prominence about 1915, and is one of the largest of the terriers, weighing about fifty pounds. It is strong and courageous, a cross of the rough-haired English terrier with the otter hound. The Irish terrier, a good watch dog, always maintains its important rank among lovers of dogs. It is larger than the fox terrier, with a light-red coat resembling the Scottish terrier's. The black-and-tan, or Manchester, has two

THE TERRIERS

(5) Scottish. (6) Welsh. (7) Schnauzer. (8) Fox (wire-haired).

varieties, large and toy, and has many admirers; it makes an interesting and intelligent pet.

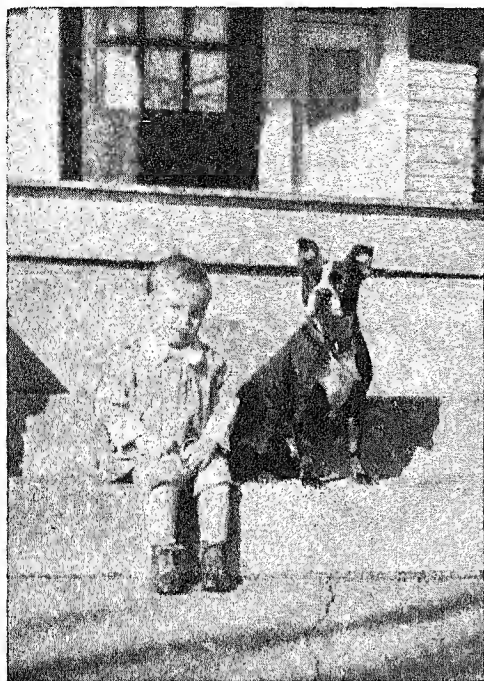
With the exception of the Scottish, the breeds of dogs mentioned above are long-legged, short-bodied, rough- or smooth-coated animals, and therefore distinct from a second, long-bodied, short-legged class, including the Scottish, Skye, Yorkshire, and the Dandie Dinmont. Terriers, being affectionate, full of sport and play, and entertaining, make delightful household pets, but their tempers depend on good treatment, and their health demands a daily walk or romp.

W.J.

Related Subjects. The reader will find the following articles helpful in connection with the study of terriers:

Airedale Dog
Bulldog
Dog

Fox Terrier
Scotch Terrier
Skye Terrier



BOBBY AND BUZZY

A wise man once said that every boy should have two inseparable companions—another boy and a dog.

TERRITORIAL EXPANSION OF THE UNITED STATES. See the article **UNITED STATES** (Growth in Area and in Population), a subtitle.

TERRITORY, in the United States, the name given to parts of the national domain which have not yet been given statehood. In this general sense, the term has included, at various times, the following classes: (1) organized territories; (2) unorganized territories; (3) insular possessions.

The government of all territories is under the direction of Congress, to which the Constitution gives the right "to make all needful rules and regulations respecting the territory or other property belonging to the United States." The government of a territory is somewhat like that of a state, but it differs in that the authority of all territorial officials is derived from the national government. An organized territory, such as Alaska, has a governor appointed by the President, with the consent of the Senate, for a term of four years, and an elected territorial legislature, whose acts are subject to veto by Congress. The judges of the lower courts are also elected, but those of the higher courts are appointed by the President. In unorganized territories, there were no elected officials of any kind, all being appointed by the President, with the consent of the Senate. Thus the laws of the United States were ex-

tended to unorganized territories, and were, in fact, their only laws. There are now no unorganized territories.

The territories have no regular Representatives in Congress. Alaska and the Hawaiian Islands each sends one delegate (which see), who is assigned a seat in the House of Representatives; he may take part in debates which relate to his territory, and serve on committees, but he has no vote. The Philippine Islands and Puerto Rico are represented in Congress by resident commissioners, whose position is similar to that of the delegates, except that they are not assigned to committees. The territories send delegates to national political conventions, with powers equal to those of other delegates.

A territory is admitted to the Union when Congress judges it fit for statehood, although it is understood that it must have sufficient population to entitle it to one member in the House of Representatives. The last territory to be admitted to statehood was Arizona, in 1912. This act completed statehood for all of continental United States.

In 1934 the Division of Territories and Island Possessions was created to administer the governments of Hawaii, Alaska, and the Virgin Islands, and to have jurisdiction over the civil affairs of Puerto Rico.

In Canada and Australia. In the Dominion of Canada, Manitoba, Saskatchewan, and Alberta were once under territorial government, and the Northwest Territories and Yukon Territory (both of which see) still have this form of administration. The government is similar to that of a territory in the United States. In Australia there was the Northern Territory (which see), formerly a part of South Australia, but in 1911 placed under the jurisdiction of the Commonwealth. In 1927 it was divided into two territories, but in 1931 an act was passed uniting these areas again. The territories of Papua and New Guinea are also administered by Australia.

Related Subjects. For details of the government of the existing American territories, see the subhead *Government* in the articles on **ALASKA**; **HAWAII**; **PHILIPPINE ISLANDS**; **PORTO RICO**.

TERROR, REIGN OF. See **FRENCH REVOLUTION**.

TERRY, ELLEN ALICIA (1848-1928), for over fifty years one of the greatest of English actresses, and for much of this period acclaimed as the greatest woman of the stage. She was born in Coventry. Her parents were players, and they began early to train their daughter for the same career. She was but eight years old when she first appeared on the stage, taking the boy's part of Mamilus, in Shakespeare's *Winter's Tale*. For the next eight years, she played minor parts in various theaters throughout Great Britain, and then retired, in 1864,

to marry the celebrated English painter G. F. Watts. For his painting *Sir Galahad*, he used his wife as a model (see WATTS, GEORGE FREDERICK; GALAHAD, SIR, illustration).

A divorce soon followed, however, and in 1867 Miss Terry again turned to the stage, appearing as Katharine in Shakespeare's *Taming of the Shrew*. Sir Henry Irving was the leading actor in this production, and her support of his work was gaining her wide



ELLEN TERRY

At left, the great actress as she appeared on her last tour of America with Sir Henry Irving. At right, Dame Ellen Terry, as she appeared in 1925, after receiving a degree at Saint Andrew's University, Scotland.

notice when she again retired, in 1868, to marry E. A. Wardell, an actor. Seven years passed before she reëntered theatrical life, and then, having once more secured a divorce, she appeared as Portia in *The Merchant of Venice*, in London. In 1878, with Irving, she played Ophelia in *Hamlet* with so much pathos and sentiment that critics gave her extravagant praise, and Irving retained her in his company as leading woman until 1902.

Miss Terry made her first tour of America with him in 1883, and met with such success, especially in highly emotional parts, that she repeated the trip nearly every year. As Portia, Lady Macbeth, Desdemona, Cordelia, and other Shakespearean women characters, she had few equals in pathos, daintiness, and grace. Nor was her ability confined to the older dramas. In such modern plays as *Alice-Sit-by-the-Fire*, by J. M. Barrie, and *Captain Brassbound's Conversion*, by Bernard Shaw, her acting showed her remarkable grasp of modern social conditions and manners. On April 28, 1906, she celebrated her stage jubilee, the fiftieth anniversary of her first appearance as an actress, and it seemed as though all London turned out to honor her. On that occasion, a purse of \$40,000 was presented to her in the name of British theatergoers.

During the next year, she surprised her admirers by marrying, at Pittsburgh, a young American actor, James Carew (1876-1938). Her last regular appearance on the stage occurred in 1919, when she played the nurse in Doris Keane's production of *Romeo and Juliet*, in London. In 1925 King George conferred on her the honor of Dame Grand Cross of the Most Excellent Order of the British Empire. The last decade of her life of eighty years was spent with her children in England. Her body was cremated, and the ashes were placed in Saint Paul's, London.

TERTIARIES, *tur' shih a riz*, a religious order of the Franciscans (which see).

TERTIARY PERIOD, the earlier of the two periods of the Cenozoic Era, succeeding the Cretaceous Period and succeeded by the Quaternary Period. The name, which means *third*, is a survival of an early classification, in which the rocks now named Paleozoic were called Primary, and those now named Mesozoic were called Secondary. The period is divided into four epochs—Eocene, Oligocene, Miocene, and Pliocene—which some geologists regard as periods. Most of the existing genera and species of animals and plants originated during the Tertiary Period, although many of the characteristic forms of life of that time are now extinct.

L.LaF.

Related Subjects. For a fuller understanding of this period, the reader is referred in these volumes to the following articles:

Cenozoic Era
Eocene Epoch
Evolution
Geology

Miocene Epoch
Oligocene Epoch
Pliocene Epoch
Quaternary Period

TESCHEN, *tesh' en*, **TREATY OF.** See **SUCCESSION WARS.**

TESLA, *tes' lah*, **NIKOLA** (1857-1943), a famous electrician, the inventor of numerous electrical devices, was born in Smiljan, in Austrian Croatia. His studies at the Gratz Polytechnic School aroused an interest in engineering and electricity, and when he went to Prague and Budapest, he continued work in these subjects, while pursuing courses in languages and philosophy. After being employed in the government telegraphic-engineering department of Austria, he became an engineer in Paris, then set out for America, and for a time was under the direction of Thomas A. Edison.

For purposes of independent research, Tesla established electrical laboratories in New York City, and his resulting inventions were distinguished alike for their brilliance and for their practicability. He was the first to substitute the alternating current for the direct current—a simpler and more economical method of converting electrical into mechanical energy. His principle of the rotary magnetic field is now in use in transmitting the power of Niagara Falls to near-by cities. His other inventions

include improvements in dynamos, arc lights, incandescent lamps, condensers, and induction coils.

TESTA, outer coat of a seed. See **GERMINATION**.

TEST ACTS, the general name given to certain religious acts passed by the English Parliament, which were intended to prevent any but members of the Established Church from holding public office. Among the principal test acts were the Corporation Act of 1661, which decreed that all magistrates must take oaths of allegiance and supremacy, and must receive communion according to the Church of England; and the Test Act of 1672, which prescribed the same tests for the holders of public offices. All such laws were eventually repealed.

TESTATOR. See **WILL**.

TESTATRIX, *tes ta' trik*s. See **WILL**.

TETANUS, *te' a nus*, medical term for lock-jaw (which see). See also **PASTEUR**, **LOUIS**.

TETON, **GRAND**. See **PARKS**, **NATIONAL** (Grand Teton National Park).

TETTER. See **ECZEMA**.

TETRAGONAL, *te' rag' o nal*, **SYSTEM**. See **CRYSTALLIZATION**.

TETRAMETER, *te' ram' e tur*. See **METER**.

TETRARCH, *te' trahrk*, or *te' rahrk*, a Greek title for the governor of the fourth part of a country. In the later Roman Empire, it was a title given to all minor rulers possessing sovereign rights, but dependent upon the emperor, especially in the East. The princes of the family of Herod, in Syria, were all called by this title. See **HEROD**.

TETRAZZINI, *te' rah't se' ne*, **LUISA** (1874-1940), one of the greatest coloratura sopranos of the modern operatic stage. At the height of her powers, she possessed a voice remarkable for its range and for the purity of its high staccato notes. She received her musical education in her native city, Florence, making her professional debut there in 1895, as Inez in *L'Africaine*. Although she attained considerable success in Italy, Russia, South America, and Mexico, it is San Francisco which claims the honor of having "discovered" Tetrazzini, and of having first acclaimed her as a second Patti.

In 1908 she repeated her triumphs at the Metropolitan Opera House in New York, singing there the part of Violetta in *La Traviata*, and thereafter was an established favorite in grand-opera and concert work in various American cities. Her repertory embraced about forty roles, including the leading soprano parts in *Rigoletto*, *La Sonnambula*, and *Lucia di Lammermoor*. In 1926 she was married in Rome to Pietro Vernati, son of a shirt-maker, and her junior by about twenty-five years. They were legally separated in 1929.

TETZEL, *te' sel*, **JOHANN** (about 1460-1519), a German monk of the Dominican Order, famous as the opponent of Martin Luther at

the beginning of the Reformation. Tetzel was born in Leipzig, and was educated at the university of that city. Soon after his graduation, in 1487, he joined the Dominican brotherhood, and speedily became known as an eloquent preacher. In 1517 he preached in the vicinity of Wittenberg concerning the granting of indulgences to those who would contribute to the fund for building Saint Peter's at Rome. Luther's famous ninety-five theses were directed against Tetzel's methods. Tetzel himself published a series of theses answering Luther, but his course had been such as to offend the authorities of the Church; a few months before his death, he was summoned before the Papal legate, and was rebuked.

See also **LUTHER**, **MARTIN**; **REFORMATION**, **THE**; **SAINT PETER'S CHURCH**.

TEUTOBURG, *toi' toh boorK*, **FOREST**. See **GERMANY** (Climate and Life Forms).

TEUTOBURG FOREST, **BATTLE OF**. See **FIFTEEN DECISIVE BATTLES**.

TEUTONIC KNIGHTS, a military order beginning in 1128 or 1129 when a wealthy German sought to relieve the sufferings of pilgrims to Jerusalem, founding the Hospital of the Blessed Virgin. During the siege of Acre (1189-1191), he was joined by citizens of Bremen and Lübeck. The group founded a field hospital and completed the order of Teutonic Knights of the Hospital of the Blessed Virgin at Jerusalem. The Knights soon acquired considerable territory in Prussia. Napoleon I dissolved the order in 1809, and its possessions were confiscated by the countries in which they were situated. In 1840 the Emperor of Austria revived the Teutonic Knights as an order for ambulance service in war.

TEUTONIC RACE, the term applied to a branch of the Aryan, or Indo-European, family, descendants of the Visigoths. The principal divisions are (1) the Scandinavian, including the Danes, Swedes, Norwegians, and Icelanders; and (2) the Germanic, including the High-German-speaking peoples of Germany proper and Switzerland and those who use the Low-German tongues (Dutch and Flemish) in The Netherlands and northern Belgium. The Angles, Saxons, and other Low-German invaders of Britain developed the composite speech used before the Norman conquest; this accounts for the large number of Anglo-Saxon words still retained in the English language. c.w.

TEWFIK, *tu' fik*. See **EGYPT** (Nineteenth-Century Egypt).

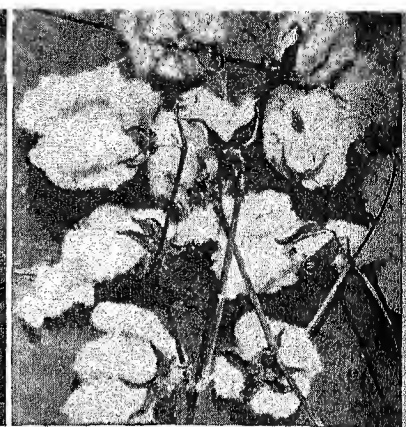
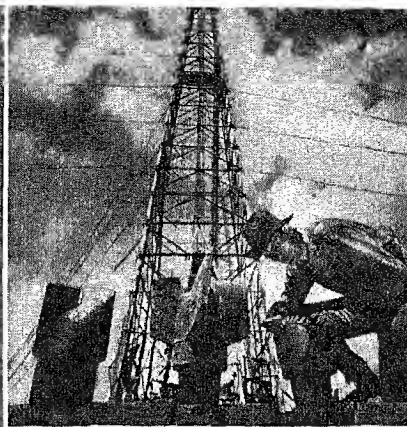
TEWKESBURY, an ancient town in Gloucestershire, England, the site of a Roman encampment, Saxon castle, and monastery.

TEWKESBURY, **BATTLE OF**. See **EDWARD (IV)**.

TEXARKANA, *tek sahr kan' ah*, **TEX**. See back of map.

TEXARKANA, **ARK**. See back of map.





Photos: Pix, Monkmeyer; Standard Oil

TEXAS THE LONE STAR STATE

TEXAS, *tek' sas*, the only one of the states which was once an independent republic, is popularly known as the LONE STAR STATE, from the single star on its flag. The word *Texas*, probably meaning *friends*, comes from *Tejas*, the name of a federation or league of Indian tribes.

Over Texas have flown the standards of six nations: the castles and lions of Spain; the lilies of France; the eagle, cactus, and serpent of Mexico; the lone star of the Texas Republic; the stars and bars of the Confederacy; and the Stars and Stripes of the United States. With its four centuries of colorful history are linked the Comanche, conquistador, missionary, cowboy, cattle king, homesteader, cotton planter, miner, lumberjack, oil driller, shipbuilder, and airplane maker. High on the honor roll of the state are the names of Austin and Houston, and of Bowie, Travis, Crockett, and the other patriots who gave their lives at the Alamo, the cradle of Texas liberty.

The largest state in the Union, Texas covers more territory than Michigan, Wisconsin, Iowa, Illinois, and Indiana combined, and is much larger than any European country except Russia. A single county, Brewster, has an area greater than the entire state of Connecticut, and is more than five times the size of Rhode Island. If the state were hinged on its Oklahoma border and folded northward, Brownsville would reach a point only about 100 miles from Canada; if it were folded on its western border, Port Arthur would fall into the Pacific about 200 miles from the coast of Lower California; folded on its eastern border, El Paso would fall into the Atlantic Ocean about 40 miles off the east coast of Florida; and folded to the southwest, the state would cover most of Mexico. The towns of Port Isabel, in the southeast, and Texline, in the northwest, are 931 miles apart, a distance 100 miles greater than that between New York and Chicago. Stratford and other towns in the northwestern part of the state are farther from their own capital at Austin than from the capitals of Oklahoma, New Mexico, Kansas, Colorado, Wyoming, and Nebraska.

Where the pioneer once built his simple home

of adobe, sod, or wood, tall buildings tower skyward in fast-growing cities. On the huge ranches and fertile farmlands, cattle, cotton, and corn flourish. Petroleum, pumped in steady streams from oil fields in many sections of the state, is piped to great refineries along the Gulf coast and to distant states. From the bustling man-made seaports of Texas, agricultural, manufactured, and mineral products are shipped to the far corners of the earth.

Texas is first among the states in size, number of farms, farm acreage, and miles of railroad; it is first in the production of cotton, wool, and mohair; it raises more cattle, mules, sheep, goats, and turkeys than any other state; it leads in the production of petroleum, natural gas, carbon black, and sulphur; it produces more helium than does any other place in the world. It is second only to California in total crop value, and to Iowa in value of farmlands and buildings. Irvin Cobb described it as having "a timbered tract as large as Massachusetts; a cotton patch in the Black Waxy country as big as all Ohio; a grazing belt in the Panhandle as large as Pennsylvania; more wheatlands than either of the Dakotas; and more cornlands than Illinois."

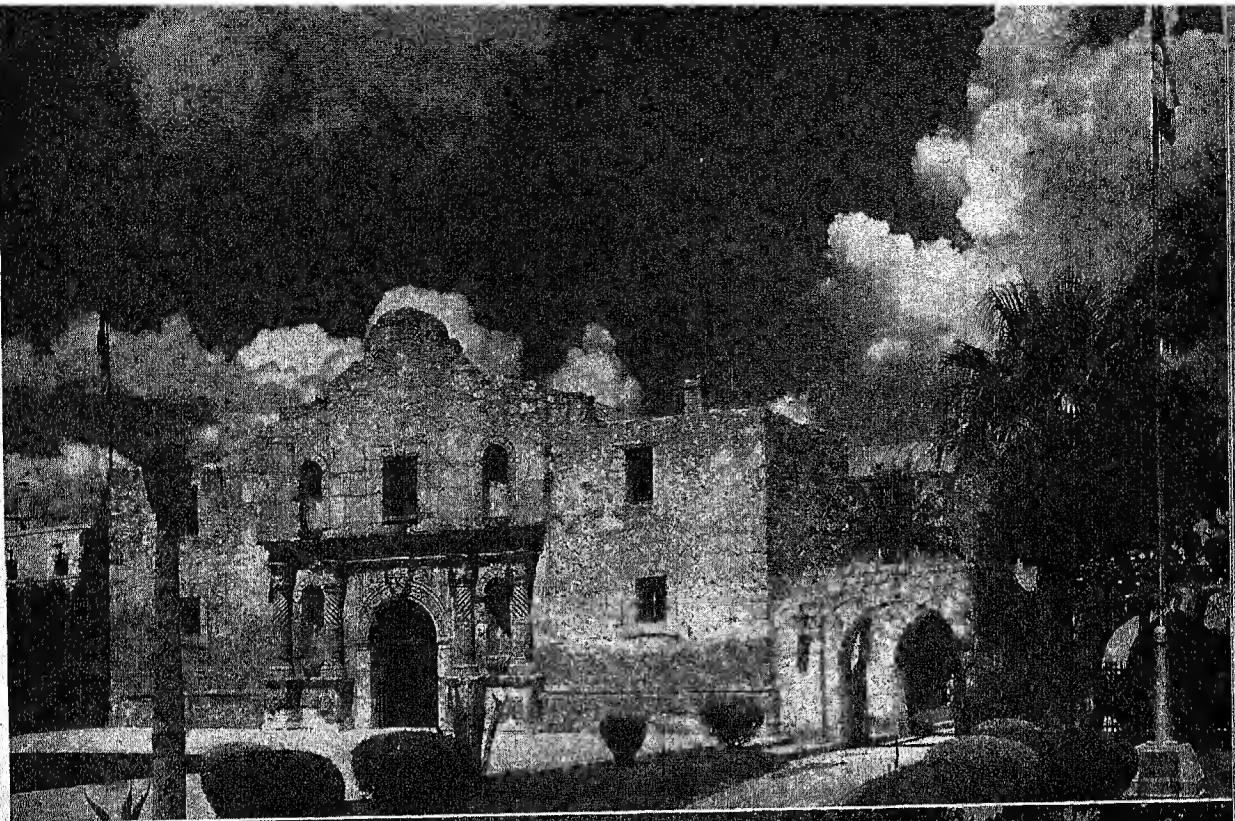
The Land and Its Resources

Extent: Area, 267,330 square miles (3,695 square miles of which are inland water); first in size among the states. *Greatest length*, 801 miles; *greatest width*, 773 miles. *Coast line*, 377 miles.

Physical Features: *Chief mountain ranges*, Guadalupe, Davis, Chisos. *Chief peaks*, Guadalupe Peak (9,020 feet), Mount Livermore (8,382 feet), El Capitan (8,078 feet), Lost Mine Peak (7,950 feet), Mount Emory (7,835 feet). *Elevation*, highest, Guadalupe Peak, 9,020 feet, in the western part of the state in Culberson County; lowest, sea level, along the Gulf coast. *Chief rivers*, Rio Grande (largest tributary, Pecos), Canadian, Red, Sabine, Neches, Trinity, Brazos (tributaries, Salt Fork and Clear Fork), Colorado (largest tributaries, Concho, San Saba, Llano), Guadalupe, San Antonio, Nueces. *Chief lakes*, Caddo, Grand, Clear, Sabine. *Chief islands*, Galveston, Padre, Matagorda, St. Joseph, Mustang.

Climate: *Temperature*, average annual, 66.3°; average summer, 82.1°; average winter, 49.7°; lowest on record, -23° at Seminole (Feb., 1933); highest on record, 120° at Seymour (Aug., 1936). *Precipitation*, average annual, 30.54 inches; average Apr. 1 to Sep. 30, 17.76 inches; average Oct. 1 to Mar. 30, 12.78 inches. *Snowfall*, average annual, 2.6 inches.

Location and Surface Features. Texas lies about halfway between Jacksonville, Fla., on the Atlantic Ocean, and San Diego, Calif., on



Photos: San Antonio Chamber of Commerce

HISTORIC LANDMARKS

Above: in 1836, the Alamo, the famous low, gray building in the heart of present-day San Antonio, became the shrine of Texas liberty, when a band of fearless Texans gave up their lives in their struggle for freedom from Mexico. To the left of the historic old mission-fort is the Alamo Museum, built by the state in 1937 and containing many interesting relics of Texas history. *Below:* Mission San José, only a few miles from San Antonio, erected in 1720 and recently restored, is one of the most beautiful missions in the United States. Its wonderfully carved "rose window" and main doorway are works of art, much admired by photographers and artists. This and the other old missions of the state, built while the Texas region was under the rule of Spain, are remarkably fine examples of Spanish ecclesiastical architecture.

the Pacific. With the exception of Florida, it is the southernmost state in the Union. Brownsville, near the mouth of the Rio Grande, is about 400 miles farther south than Ciudad Juárez, a city across the border from El Paso in northern Mexico; it is nearer the equator than Cairo, Egypt, or Delhi, the capital of India. For the boundaries of Texas, see the colored map.

Texas consists of several vast plains sloping from a mountainous tableland in the northwest to the low, marshy coast of the Gulf of Mexico.



It is the meeting place of four great natural regions: the Coastal Plains, the North-Central Plains, the Great Plains, and the Trans-Pecos Region. Within its borders are found deserts and swamps; treeless prairies and heavily forested plains; low, sandy beaches and steep rocky canyons.

The Coastal Plains, extending inland, are part of the fertile lowlands which border the Gulf of Mexico from the Rio Grande to the southern tip of the west coast of Florida. They vary in width from fifty to more than 300 miles, and in elevation from sea level to about 300 feet. Fringing the shore is a series of narrow sandbars or islands enclosing shallow lagoons, which help to protect the coast from ocean storms and tidal waves. Padre Island, the largest of the bars, is about 100 miles long.

Bordering much of the coast is a subtropical region where hardwoods and rice alternate along the streams. In the southernmost part of the plains and extending westward from the Gulf is the fertile valley of the lower Rio Grande, noted for its winter vegetables and fruits. In the northeast is a rolling timberland, with dense forests of pine, cypress, and other valuable trees, a belt that extends into Arkansas and Louisiana. The sandy soils of this region are especially suited to mixed farming and fruit-growing. Large deposits of petroleum, natural gas, sulphur, salt, iron, and coal are found in various sections.

The North-Central Plains, lying west of the timbered belt, are the most densely populated and the best agricultural areas of Texas. They include the famous Black and Grand prairies, and are especially suited to the growth of cotton and small grains. Toward the west, the prairies become broken and rise to meet the Great Plains. This hilly section is an important grazing region; it also contains rich deposits of coal and oil.

The Great Plains extend westward from the North-Central Plains into New Mexico, and southward from the northern boundary of the state to the Pecos River and the Coastal Plains. They are a series of treeless plains which extend northward into Canada. Their altitude ranges from about 700 feet above sea level on the east to more than 4,000 on the west. In the north is a high plateau which forms part of the Panhandle (so called because of its shape). Once a region of large cattle ranches, this is now the greatest wheat-producing area of Texas. Here also is one of the richest oil-and-gas fields in the United States.

Stretching along the western border and continuing into New Mexico is the high, level prairie known as the Llano Estacado or Staked Plain. According to some accounts, its name originated with the Indians, who drove stakes into the plains to direct the great leader whom they expected would come to lead them to victory over their enemies. Others claim that Coronado, the Spanish explorer, gave the region its name when he "staked" the plains with heaps of cattle bones to guide his troops across the wilderness. In early days, even the Indians

Pronunciation Guide

Brazoria brah zo' rih ah
Brazos brah' zoss
Buescher boo' sher
Cabeza de Vaca, Núñez kah da' thah
day vah' kah, noo' nyeth
Caddo kah' dah
Camino Real kah me' noh reh' ahl
Chihuahua chee wah' wah
Chisos che' zus
Ciudad Juárez syu thaath' hwah' rase
Cuero kwa' roh
De Padilla, Fra Juan day pah da' yah,
frak hwahn

De Pineda, Alvarez day pec neh' dah,
ahl' vah rayth
Elena eh lay' nah
Elizario el ee zo' ray oh
Espejo es pa' koh
Goliad goh lih ad'
Groce gros
Guadalupe gwah thah loo' pay
Hidalgo ee thahl' goh
Houston hoes' tun
huajillo wah heel' yoh
Jacinto jah sin' toh
José hoh soy'

Llano Estacado lyah' noh es tah kah'
dah
Mejicano may hee kah' noh
Mexia mek ha' ah
Nacogdoches nah oh do' chee
Neches nech' ez
Nueces nwa' sase
Pecos pa' kohs
Rio Grande re' oh grahn' day
Sabine sah been'
Tejas leh' hahs
Villita veel ye' tah
Ysleta ees leh' lah

feared to cross the Llano Estacado during the dry season, for the water holes were from fifty to eighty miles apart. Today, it is still an important grazing region, but many of the cattle ranges are giving way to the white bloom of cotton and the yellow of ripening wheat. In the southern part of the Great Plains is the Edwards Plateau. Covered with mesquite (which see) and native grasses, it provides feed for large herds of cattle and goats and flocks of sheep. Eastward is a broken region of hills, streams, and picturesque scenery. Salt, building stones, and petroleum are the chief mineral resources.

The Trans-Pecos Region in the extreme west, between the Pecos River and the Rio Grande, consists of semiarid, elevated plains crossed by several spurs of the Rocky Mountains. These are locally known as "lost mountains," because most of the lofty masses do not form continuous ranges. Most of the mountain slopes are bare of trees, but yucca and mesquite flourish. The more level sections, carpeted with buffalo and gama grasses are given over chiefly to ranching. Other vegetation consists of a tangle of cacti and chaparral. (See YUCCA; GAMA GRASS; CHAPARRAL.) Along the upper Rio Grande and the Pecos River are a number of mountain gorges, one of the most impressive being the Grand Canyon of Santa Elena, near Marathon. Cut by the Rio Grande, it is about fifteen miles long and from about 1,500 to 1,800 feet deep. Among the minerals underlying this region are iron, lead, silver, copper, quicksilver, and building stones.

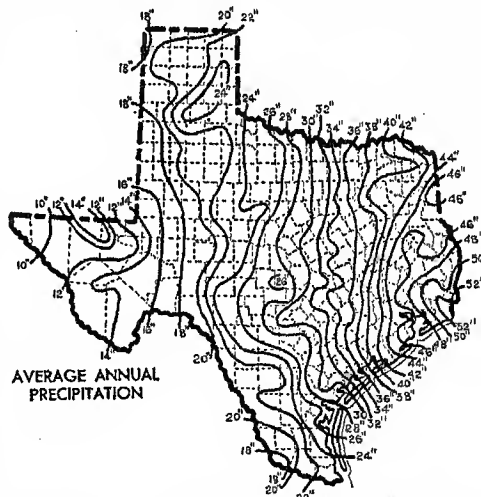
Rivers and Lakes. All but three of the forty-four rivers of the state follow the general slope of the land and flow southeast into the Gulf of Mexico. The exceptions are the Red River emptying into the Mississippi, the Canadian into the Arkansas, and the Pecos into the Rio Grande. All but the Rio Grande, the Pecos, the Canadian, and the Brazos, which rise in New Mexico and Colorado, have their source within the state. In the arid west, many of the stream beds are usually dry except after heavy rains. In the east, where the rainfall is heavier, there are more streams, many of them becoming sluggish and muddy as they near the coast. One of the most important rivers is the Brazos, which flows for hundreds of miles through a rich and highly developed section of the state. It is navigable for forty miles from the Gulf at all seasons. It was on its banks that Stephen F. Austin, the "Father of Texas," established his first settlement. In the dry areas, many of the streams provide water for irrigation; in the eastern timber belt, the Sabine River is used to float logs from its forested banks to the sawmills near its mouth.

The Rio Grande, which the Spaniards named *Rio Bravo del Norte* (Bold River of the North), is one of the longest and most historic rivers

of North America. For a distance of about 800 miles, it forms the international boundary between the United States and Mexico. In earlier days, its mouth was a haven for pirates and a refuge for their ships during Gulf storms. Many rustlers (cattle thieves) escaped across its muddy waters into Mexico to evade the rough-and-ready justice of the day. Today, immigration and customs officials are stationed at various points along the border, and United States troops patrol the northern bank.

Texas has no large bodies of water, but there are many small, fresh-water lakes in the Coastal Plains, as well as a number of man-made lakes. Of the former, Caddo, on the Texas-Louisiana border, is the largest. Salt ponds are numerous near the mouth of the Rio Grande, in the Llano Estacado, and in the Trans-Pecos Region.

Climate. Within the vast bounds of Texas, the climate ranges from subtropical along the Gulf coast to moderately temperate in the northwest. While oranges are ripening along the Gulf, blizzards may be raging in the northwest. In the lower Rio Grande Valley, the warmest part of the state, the average annual temperature is 74°; in the northwestern Panhandle, the coolest section, it is 54°. Along the coast, the Gulf winds temper both the heat of summer and the cold of winter, and the mild, delightful climate of southern Texas has made



that section a popular year-round resort. Along the Gulf, the country is low and the climate warm; in the northeast, it is low and damp, but cool; in the central and western regions, it is high, dry, and cool. In the northwest, winters are sometimes long and severe. On the Llano Estacado, the air is so clear and dry that it is almost impossible to estimate distances, and mirages occur frequently (see MIRAGE).

Rainfall is heaviest in the east, where it averages from thirty to fifty inches a year,



decreasing gradually toward the west. Port Arthur, at the mouth of the Sabine River, has over forty inches more rainfall each year than has El Paso on the Rio Grande. On the coast, autumn is the rainy season; in the northwest, spring. Although the average annual snowfall on the high plains of the Panhandle is more than twenty inches, snow rarely falls in the south-central and southern areas.

On the plains and prairies, where no dense forests or mountains break its force, the wind is often brisk, and has been known to reach a velocity of more than eighty miles an hour. Occasionally during the winter, the state is swept by disagreeable winds from the north, accompanied by sleet and heavy rain. See NORTHER.

Natural Resources. The natural wealth of Texas is enormous. More than five hundred types of soil make possible a wide variety of crops. Its commercially profitable minerals, including immense reserves of oil and natural gas, number more than eighty. In its forested areas grow valuable pine and hardwood trees. Embracing the central and north-central sections and the Coastal Plains is the largest artesian-water belt in the world. Such cities as Galveston, Houston, and San Antonio derive their entire water supply from it, and thousands of acres are irrigated with artesian-well water (see ARTESIAN WELL). Valuable mineral waters are found, especially at Mineral Wells, Marlin, Hot Sulphur Springs, and Wootan Wells.

There are about 250 species of fish, nearly one half of which are fresh-water varieties. Among the animals of the state are the muskrat, opossum, skunk, raccoon, fox, mink, civet cat, ringtail cat, bobcat, cougar, ocelot, otter, wolf, badger, and coyote. The beaver lives along the Rio Grande; a few mountain sheep are in the Trans-Pecos Region; and deer and wild turkey still abound in some sections. Among the game birds are various species of wild ducks, wild geese, quail, and prairie chickens.

Texas conserves its wild life mainly through its Game, Fish, and Oyster Commission and State Park Service. About two million acres have been set aside as game preserves, and a number of fish hatcheries are maintained. Thousands of acres of cutover lands are reforested each year. Laws to prevent the overproduction of petroleum and the waste of natural gas are administered by the Railroad Commission. Water-conservation measures include the harnessing of most of the larger rivers and the construction of many artificial lakes. Among these reservoirs are Lakes Dallas and White Rock, near Dallas, in the Trinity basin, and Lake Kemp, near Wichita Falls, in the Red River Valley. The agricultural sections are further protected by a number of projects for the prevention of erosion.

The People and Their Work

Population: 6,414,824 (1940), ranking sixth among the states. **Density,** 23.99 persons per square mile, ranking thirty-fifth. **Distribution,** urban, 45.4 per cent; rural, 54.6 per cent. **Largest cities,** Houston (384,514), Dallas (294,734), San Antonio (253,854), Fort Worth (177,662), El Paso (66,810), Austin (87,930), Galveston (60,862). For population of other cities, see back of colored map. **Ports,** Beaumont, Brownsville, Corpus Christi, Freeport, Galveston, Houston, Ingleside, Orange, Port Aransas, Port Arthur, Port Bolivar, Port Isabel, Port Lavaca, Port Neches, Sabine, Texas City.

Chief Products: *Agricultural,* cotton, cattle, dairy products, corn, hogs and pork, wheat, eggs, grain sorghums, oats, rice, fruits, vegetables, pecans, horses and mules, sheep and wool, goats and mohair, poultry (especially turkeys), bees and honey. *Mineral,* petroleum, natural gas, natural gasoline, sulphur, salt, helium, gypsum, limestone, clays. *Manufactured,* petroleum, lumber, cottonseed, peanut, and clay products; oil-field machinery, newspapers and periodicals, meats, flour, cement, carbon black, chemicals, cotton textiles, airplanes, canned fruits and vegetables, brooms, sugar, and lime.

The People. In spite of its size, Texas has fewer people than has New York City. With an average density of population only a little more than one half that of the entire nation, it could easily double, or even triple, the number of its inhabitants, and still not be crowded. It could increase its population nearly twenty-eight times before it would have as many persons to the square mile as has Rhode Island, the most densely populated of the states. More than one fourth of all the people live in the counties in which Houston, Dallas, Fort Worth, and San Antonio are located.

Although nearly thirty Indian tribes inhabited Texas when the Spaniards first visited the region, there were only 1,103 Indians in the state in 1940. Of these, about one third live on a reservation in Polk County, the only one in the state. In 1820 there were only a few thousand white inhabitants. A few French lived in the small frontier towns, but most of the people were Spanish missionaries, soldiers, and settlers; the Mexican peons who worked for them; and Anglo-American pioneers. Following the arrival of Stephen F. Austin in 1821, more and more settlers from Tennessee, Alabama, Mississippi, and other southern states came as their cotton and tobacco lands failed. With them were Negro slaves to work on the cotton and rice plantations. By 1850, the population of the state had grown to more than 200,000, of whom nearly 60,000 were Negroes.

Attracted by the rich agricultural lands, more immigrants arrived between 1820 and 1860. Among them were Irish, Germans, Czechs, Poles, French, Belgians, Alsatians, Netherlands, and Swiss. Many of these, particularly the Irish, German, Poles, and Czechs, were political or religious refugees. Following the War between the States, newcomers continued to pour in. Among these were Englishmen who became ranch owners, and plantation families from east of the Mississippi, who followed the bloom of the cotton toward the setting sun. In 1852, when Robert E. Lee was on a visit to Texas, he was asked what he saw as he gazed over the great stretches of unsettled prairies. "I am

TEXAS

Abernathy, (D3),	847	Brackettville, (D5) 2,653	Como, (G3),	412	Farmersville, (F3) 2,206	Hebbronville, (E6) 2,640			
Abilene, (E3),	26,612	Bradshaw, (E3),	550	Conroe, (G4),	4,624	Hedley, (D2),	637		
Acme, (E2),	565	Brady, (E4),	5,002	Cookville, (G3),	462	Hempstead, (F4),	739		
Alamo, (E6),	1,944	Brashear, (G3),	330	Coolidge, (F4),	1,102	Ferris, (F3),	1,436		
Alamo Heights, (E4),	5,700	Brazoria, (G5),	880	Cooper, (G3),	2,537	Finca, (F3),	385		
Alba, (G3),	675	Breckenridge, (E3) 5,826	Copperas Cove, (F4),	356	Flannery, (F3),	475	Henrietta, (E3),	2,391	
Albany, (E3),	2,230	Bremont, (F4),	1,106	Corpus Christi, (F6),	57,301	Florence, (F4),	476	Hereford, (C2),	2,584
Alexander, (E3),	529	Brenham, (F4),	6,435	Corrigan, (G4),	1,402	Floresville, (E5),	1,708	Hermleigh, (D3),	404
Alice, (E6),	7,792	Bridgeport, (F3),	1,735	Corsicana, (F3),	15,232	Floydada, (D3),	2,726	Hico, (E4),	1,242
Allen, (F3),	550	Broadus, (G4),	440	Cotulla, (E5),	3,633	Fluvanna, (D3),	412	Hidalgo, (E6),	693
Allred, (C3),	440	Bronson, (G4),	1,320	Covington, (F3),	570	Follett, (D1),	431	Higgins, (D1),	741
Alpine, (C6),	3,866	Bronte, (D4),	754	Crane, (C4),	1,420	Forney, (F3),	1,295	Highland Park, (F3),	10,288
Alta Loma, (G5),	440	Brookeland, (H4),	553	Crawford, (F4),	471	Forsan, (D3),	440	Hillsboro, (F3),	7,799
Alto, (G4),	1,141	Brookshire, (G5),	565	Crockett, (G4),	4,536	Fort Davis, (C6),	734	Holland, (F4),	741
Alvarado, (F3),	1,324	Brownfield, (C3),	4,009	Crosbyton, (D3),	1,615	Fort Hancock, (E6) 385	Holladay, (E3),	798	
Alvin, (G5),	3,087	Brownson, (G3),	640	Cross Plains, (E3) 1,229	1,650	Fort Stockton, (C4) 3,294	Hondo, (E5),	2,750	
Alvord, (F3),	821	Brownsville, (F7) 22,083	Crowell, (E3),	1,817	Ft. Worth, (F3) 177,662	Houston, (G5),	384,514	Honey Grove, (G3) 2,456	
Amarillo, (C2),	51,686	Brownwood, (E4) 13,398	Crystal City, (E5) 6,529	1,817	Postoria, (G4),	Houston, (G5),	384,514	Houston, (G5),	384,514
Amherst, (C3),	749	Bruceville, (F4),	552	Cuero, (F5),	5,474	Powerton, (E5),	660	Howe, (F3),	546
Anahua, (G5),	550	Bryan, (F4),	11,842	Cumby, (G3),	642	Franklin, (F4),	1,087	Hubbard, (F4),	1,871
Anderson, (G4),	540	Bryson, (E3),	806	Cushing, (G4),	473	Frankston, (G3),	1,216	Hughes Springs, (G3),	767
Andrews, (C3),	611	Buckholts, (F4),	880	Daingerfield, (G3) 1,032	473	Fredericksburg, (E4),	3,544	Hull, (G4),	1,100
Angleton, (G5),	1,763	Buffalo, (G4),	737	Daisetta, (G4),	3,300	Freeport, (G5),	2,579	Humble, (G4),	1,371
Anna, (F3),	509	Buna, (H4),	440	Dalhart, (C1),	4,682	Freer, (E6),	2,346	Huntington, (G4),	969
Annona, (G3),	446	Burkburnett, (E2) 2,814	Byers, (E2),	427	Dallas, (F3),	Friona, (C2),	803	Huntsville, (G4),	5,108
Anson, (D3),	2,338	Burkeville, (H4),	890	Bynum, (F4),	350	Frisco, (F3),	670	Hutchins, (F3),	560
Anton, (C3),	548	Burleson, (F4),	573	Caddo, (E3),	385	Fritch, (D2),	550	Idolou, (D3),	503
Appleby, (G4),	550	Burnet, (E4),	1,945	Caddo Mills, (F3),	390	Frost, (F3),	671	Industry, (F5),	660
Aquilla, (F4),	557	Burton, (F4),	558	Caddwell, (F4),	2,165	Fruitdale, (F3),	515	Iola, (G4),	550
Aranas Pass, (F6) 4,095		Byers, (E2),	427	Calvert, (F4),	2,366	Galena Park, (G5) 1,562	Iowa Park, (E3),	1,980	
Archer City, (E3) 1,675		Bynum, (F4),	350	Camden, (G4),	553	Galveston, (G5),	60,862	Iraan, (D4),	1,603
Arlington, (F3),	4,240	Caddo, (E3),	385	Camden, (G4),	553	Ganado, (F5),	717	Iredell, (F4),	483
Arr, (G3),	1,139	Caddo Mills, (F3),	390	Camden, (G4),	553	Garland, (F3),	1,233	Irland, (F4),	385
Ashterton, (E5),	1,538	Caddwell, (F4),	2,165	Camden, (G4),	553	Garrison, (G4),	770	Irving, (F3),	1,089
Aspermont, (D3),	1,041	Calvert, (F4),	2,366	Camden, (G4),	553	Garwood, (F5),	445	Italy, (F3),	1,224
Athens, (G3),	4,765	Camden, (G4),	553	Camden, (G4),	553	Gary, (G3),	385	Itasca, (F3),	1,759
Atlanta, (G3),	4,453	Camron, (F4),	5,040	Camden, (G4),	553	Gatesville, (F4),	3,177	Jacksboro, (E3),	2,368
Aubrey, (F3),	472	Campbell, (G3),	428	Camden, (G4),	553	Gause, (F4),	825	Jacksonville, (G4) 7,213	
AUSTIN, (F4),	87,930	Camp Wood, (D5) 778	Denison, (F3),	15,581	Georgetown, (F4) 3,682	Jasper, (H4),	3,497	Jacksonville, (G4) 7,213	
Avery, (G3),	477	Canadian, (D2),	2,151	Denison, (F3),	11,192	Giddings, (F4),	2,166	Jayton, (D3),	770
Avenger, (G3),	624	Canton, (G3),	715	Denver City, (C3) 1,000	822	Gilmer, (G3),	3,138	Jefferson, (G3),	2,797
Baird, (E3),	1,810	Canutillo, (A6),	907	Deport, (G3),	822	Girard, (D3),	554	Jewett, (F4),	515
Balling, (D4),	4,472	Canyon, (D2),	2,622	Detroit, (G3),	1,064	Gladewater, (G3) 4,454	Johnson City, (E4) 378	Johnson City, (E4) 378	
Balmorhea, (C6),	1,342	Carbon, (E3),	459	Deweyville, (H4),	1,650	Glen Rose, (F3),	1,050	Jonesboro, (F4),	415
Bandera, (E5),	1,100	Carlisle, (G3),	1,650	Dexter, (F3),	387	Glidden, (E5),	440	Josephine, (F3),	660
Bangs, (E4),	756	Carmine, (F4),	556	D'Hanis, (E5),	445	Golden, (G3),	440	Josbua, (F3),	891
Barry, (F3),	385	Carmona, (G4),	552	Diholl, (G4),	1,499	Goldsmith, (C4),	935	Jourdanton, (E5),	950
Barstow, (C6),	558	Carrizo Springs, (E5),	2,494	Dickens, (D3),	465	Goldthwaite, (E4) 1,414	Junction, (E4),	2,086	
Bartlett, (F4),	1,668	Carrollton, (F3),	921	Dickinson, (G5),	1,100	Goliad, (F5),	1,446	Justin, (F3),	542
Bastrop, (F4),	1,976	Carthage, (G3),	2,178	Dilley, (E5),	1,244	Gonzales, (F5),	4,722	Karnes City, (E5) 1,571	
Batson, (G4),	1,100	Cason, (G3),	558	Dime Box, (F4),	560	Goose Creek, (G5) 6,929	Katy, (G5),	440	
Bay City, (F5),	6,594	Castroville, (E5),	746	Dimmitt, (C2),	943	Gordon, (E3),	532	Kaufman, (F3),	2,654
Baytown, (G5),	5,720	Catarina, (E5),	403	Dodge, (D2),	552	Goree, (E3),	425	Keene, (F3),	464
Beasley, (G5),	390	Cat Spring, (F5),	375	Dodson, (D2),	357	Gorman, (E3),	1,157	Kelty, (G4),	880
Beaumont, (H4),	59,061	Cedar Hill, (F3),	476	Donna, (E6),	4,712	Grafado, (E3),	804	Kemp, (F3),	1,000
Beckville, (G3),	453	Celeste, (F3),	730	Dorchester, (F3),	446	Graham, (E3),	5,175	Kennedy, (F5),	2,891
Bedias, (G4),	560	Celina, (F3),	994	Doucette, (G4),	554	Granbury, (F3),	1,166	Kennard, (G4),	664
Beeville, (F5),	6,789	Center, (G4),	3,010	Dublin, (E3),	2,546	Grandfalls, (C4),	653	Kerns, (F3),	1,287
Bellaire, (G5),	1,124	Center Point, (E5) 660	Dumas, (D2),	2,117	Grand Prairie, (F3),	1,595	Kerrville, (E4),	5,572	
Bellevue, (E3),	503	Centerville, (G4),	900	Dundee, (G4),	440	Grand Saline, (G3) 1,641	Kilgore, (G3),	6,708	
Bells, (F3),	454	Chandler, (G3),	687	Durango, (F4),	2,200	Grandview, (F3),	823	Killeen, (F4),	1,263
Bellville, (F4),	1,347	Channing, (C2),	522	Eagle Lake, (F5),	2,124	Granger, (F4),	1,723	Kingsbury, (F5),	380
Belton, (F4),	3,572	Chapel Hill, (F4),	1,100	Eagle Pass, (D5),	6,459	Grapeland, (G4),	1,327	Kirbyville, (G4),	1,088
Benavides, (E6),	3,081	Charlotte, (E5),	445	East Bernard, (F5) 450		Grayburg, (G4),	520	Kirkland, (D2),	668
Benjamin, (E3),	599	Chico, (F3),	1,125	E. Columbia, (G5) 442		Greenville, (G3),	13,995	Kleburg, (F3),	385
Berclair, (F5),	385	Childress, (D2),	6,464	Eastland, (E3),	3,849	Greggton, (G3),	1,992	Knox City, (E3),	1,127
Bertram, (F4),	605	Chillicothe, (E2),	1,423	Ector, (F3),	457	Gregory, (F6),	440	Kosse, (F4),	881
Bessmer, (H4),	1,112	China, (G4),	386	Edcouch, (E6),	447	Griffing Park, (G5) 1,344	Krum, (F3),	785	
Best, (D4),	440	Chireno, (G4),	558	Eddy, (F4),	1,603	Groesbeck, (F4),	2,272	Kyle, (F4),	874
Big Lake, (D4),	763	Christoval, (D4),	604	Eden, (E4),	1,603	Groom, (D2),	475	Lacoste, (E5),	440
Big Sandy, (G3),	609	Cisco, (E3),	4,868	Edgewood, (G3),	738	Groveton, (G4),	940	Ladonia, (F3),	1,279
Big Spring, (D3) 12,604		Clarendon, (D2),	2,431	Edinburg, (E6),	8,718	Gruver, (D1),	350	La Feria, (F6),	1,644
Bluff Wells, (E5),	866	Clarks, (G3),	4,095	Edna, (F5),	2,724	Gulf, (G5),	1,650	La Grange, (F5),	2,531
Bishop, (F6),	1,329	Cleburne, (F3),	10,558	El Campo, (F5),	3,906	Gunter, (F3),	481	Laird Hill, (G3),	550
Blackwell, (D3),	553	Cleveland, (G4),	1,783	Eldorado, (D4),	1,530	Gustine, (E4),	409	Lake Dallas, (F3),	537
Blanco, (E4),	453	Clifton, (F4),	1,732	Electra, (E2),	5,588	Hale Center, (D2),	836	Lakeview, (G5),	852
Blessing, (F5),	560	Clyde, (E3),	800	Elgin, (F4),	2,008	Hallettsville, (F5) 1,581	Lamesa, (D3),	6,038	
Bloomburg, (H3),	471	Coahoma, (D3),	574	Elisaville, (E3),	886	Hallsville, (G3),	528	Lampasas, (E4),	3,426
Bloomington, (F5) 679		Cockrell Hill, (F3) 1,246	562	Elkhart, (G4),	751	Hamilton, (E4),	2,716	Lancaster, (F3),	1,151
Blossom, (G3),	858	Coldwater, (G4),	562	Elmo, (F3),	451	Hamlin, (D3),	2,406	La Porte, (G5),	3,072
Blueridge, (F3),	440	Coleman, (E4),	6,054	El Paso, (A6),	96,810	Happy, (D2),	576	La Pryor, (E5),	555
Bluff Dale, (E3),	748	College Station, (F4),	2,184	Emory, (G3),	770	Hargill, (E6),	494	Laredo, (E6),	39,274
Blum, (F3),	441	Collinsville, (F3),	653	Enclinal, (E5),	885	Harleton, (G3),	393	Larue, (G3),	558
Boerne, (E5),	1,271	Colmesneil, (G4),	665	Ennis, (F3),	7,087	Harlingen, (F6),	13,306	Latexo, (G4),	440
Bogata, (G3),	800	Colorado City, (D3),	5,213	Estelline, (D2),	603	Haskell, (E3),	3,051	La Vernia, (E5),	522
Bomarton, (E3),	660	Columbus, (F5),	2,422	Eustace, (G3),	440	Hawkins, (G3),	554	League City, (G5),	880
Bonham, (F3),	6,349	Comanche, (E4),	3,209	Evant, (E4),	556	Hearne, (F4),	3,511	Lefors, (D2),	809
Booker, (D1),	386	Commerce, (F3),	4,699	Fabens, (A6),	3,000			Leonard, (F3),	1,331
Borger, (D2),	10,018			Fairfield, (F4),	1,047				
Bowie, (F3),	3,470			Falfurrias, (E6),	1,540				
Boyd, (F3),	496			Falls City, (F5),	564				

TEXAS (Continued)

Levelland, (C3)...	3,091	Morton, (C3)...	1,137	Pilot Point, (F3)...	1,122	Saint Jo, (F3)...	1,010	Tenaha, (G4)...	608
Lewisville, (F3)...	873	Moulton, (F5)...	643	Pineland, (F4)...	1,650	Salado, (F4)...	518	Terrell, (F3)...	10,481
Lexington, (F4)...	531	Mt. Calm, (F4)...	525	Pioneer, (E3)...	1,654	San Angelo, (D4) 25,802		Terrell Wells, (E5)...	1,236
Liberty, (F4)...	3,087	Mt. Enterprise, (G4)...	622	Pittsburg, (G3)...	2,916	San Antonio, (E5)...	253,854	Texas City, (G5)...	17,039
Liberty Hill, (F4)...	550	Mt. Pleasant, (G3) 4,528		Plainview, (D2)...	8,263	San Augustine, (H4)...	1,516	Texline, (C1)...	385
Lindale, (G3)...	820	Mt. Vernon, (G3) 1,443		Plano, (F3)...	1,582	San Benito, (F6)...	9,501	Texon, (D4)...	1,235
Linden, (G3)...	1,168	Muenster, (F3)...	599	Pleasanton, (E5)...	2,074	Sanderson, (C4)...	2,062	Thorndale, (F4)...	898
Littlefield, (G3)...	3,817	Muleshoe, (C2)...	1,327	Poetry, (F3)...	440	San Diego, (E6)...	2,674	Thornton, (F4)...	745
Livingston, (G4)...	1,851	Mullin, (E4)...	404	Port Aransas, (F6)...	495	San Elizario, (A6)...	917	Thorp Spring, (F3)...	436
Llano, (E4)...	2,658	Munday, (E3)...	1,545	Port Arthur, (H5) 46,140		Sanger, (F3)...	1,000	Thrall, (F4)...	436
Lockhart, (F5)...	5,018	Murchison, (G3)...	408	Port Isabel, (F6)...	1,440	San Juan, (E6)...	2,264	Throckmorton, (E3)...	1,133
Lockney, (D2)...	1,231	Myra, (F3)...	412	Port Lavaca, (F5) 2,069		San Marcos, (E5)...	6,006	Timpson, (G4)...	1,494
Lometa, (E4)...	915	Myrtle Springs, (G3)...	385	Port Neches, (H5) 2,487		San Saba, (E4)...	2,927	Tioga, (F3)...	638
Lone Oak, (G3)...	735	Nacogdoches, (G4) 7,538		Port O'Connor, (F5) 385		Santa Anna, (E4)...	1,661	Tivoli, (F5)...	400
Longview, (G3)...	13,758	Naples, (G3)...	821	Post, (D3)...	2,046	Santo, (E3)...	465	Tomhall, (G4)...	668
Loraine, (D3)...	700	Nash, (G3)...	532	Poteet, (E5)...	2,315	Saratoga, (G4)...	1,100	Toyah, (C6)...	464
Lorena, (F4)...	396	Navasota, (G4)...	6,138	Poth, (E5)...	509	Savoy, (F3)...	298	Trent, (D3)...	366
Lorenzo, (D3)...	616	Neches, (G4)...	440	Powell, (F3)...	550	Schertz, (E5)...	385	Trenton, (F3)...	634
Lott, (F4)...	1,021	Nederland, (G5) 1,650		Prairie Hill, (F4)...	554	Schulenburg, (F5) 1,970		Trinidad, (G3)...	848
Lovelady, (G4)...	542	Needville, (G5)...	557	Premont, (E6)...	1,080	Scotland, (E3)...	347	Trinity, (G4)...	2,217
Loving, (E3)...	385	Nevada, (F3)...	425	Presidio, (B7)...	1,320	Scurry, (F3)...	440	Troup, (G3)...	1,526
Luhbeck, (D3)...	31,853	Newark, (F3)...	375	Preston Hollow, (F3)...	887	Seadrift, (F5)...	437	Tulia, (D2)...	2,055
Lueders, (E3)...	715	New Boston, (G3) 1,111		Priddy, (E4)...	448	Seagoville, (F3)...	760	Turkey, (D2)...	930
Lufkin, (G4)...	9,567	New Braunfels, (E5)...	6,976	Proctor, (E4)...	357	Seagraves, (C3)...	3,225	Turnertown, (G3)...	350
Luling, (F5)...	4,437	Newcastle, (E3)...	1,044	Putnam, (E3)...	487	Sealy, (F5)...	2,200	Tyler, (G3)...	28,279
Lyford, (F4)...	891	New Gulf, (G5)...	1,744	Quannah, (E2)...	3,767	Seguin, (F3)...	7,006	University Park, (F3)...	14,458
Lyons, (F4)...	525	Newton, (H4)...	880	Queen City, (G3)...	353	Selman, (G3)...	550	Uvalde, (E5)...	6,679
Lytle, (E5)...	550	New Ulm, (F5)...	556	Quinlan, (F3)...	677	Seminole, (C3)...	1,761	Valentine, (B6)...	499
McAllen, (E6)...	11,877	New Waverly, (G4)...	665	Quitman, (G3)...	880	Seymour, (E3)...	3,328	Valley Mills, (F4)...	803
McCamey, (C4)...	2,595	Nixon, (F5)...	1,835	Ralls, (D3)...	1,512	Shafer, (B7)...	577	Valley View, (F3)...	770
McDade, (F4)...	495	Nocona, (F3)...	2,605	Randolph Field, (E5)...	1,320	Shiner, (F5)...	1,520	Van, (G3)...	983
McGregor, (F4)...	2,062	Nomaco, (F4)...	440	Ranger, (E3)...	4,553	Shiro, (G4)...	574	Van Alstyne, (F3) 1,650	
McKinney, (F3)...	8,555	Norman, (F5)...	411	Rankin, (D4)...	672	Sierra Blanca, (B6) 795		Van Horn, (B6)...	939
McLean, (D2)...	1,489	Nordheim, (F5)...	411	Ratchiff, (G4)...	2,200	Silsbee, (G4)...	2,325	Vega, (C2)...	660
Mabank, (F3)...	988	Normangee, (G4)...	535	Raymondville, (F6)...	4,050	Silverton, (D2)...	684	Velasco, (G5)...	9,277
Madisonville, (G4) 2,095		North Pleasanton, (E5)...	673	Reagan, (F4)...	353	Sinton, (F5)...	3,770	Vernon, (E2)...	11,566
Magnolia, (G4)...	440	North Zulch, (F4)...	442	Realitos, (E6)...	445	Sipe Springs, (E3)...	632	Victoria, (F5)...	825
Malakoff, (G3)...	2,384	Oakhurst, (G4)...	560	Red Oak, (F3)...	440	Skellytown, (D2)...	575	Voth, (G4)...	825
Malone, (G4)...	429	Oakville, (E5)...	474	Refugio, (F5)...	4,077	Skidmore, (F5)...	932	Waco, (F4)...	55,982
Manor, (F4)...	688	Oakwood, (G4)...	1,086	Rice, (F3)...	489	Skidmore, (F5)...	932	Wadsworth, (G5)...	983
Mansfield, (F3)...	774	Odessa, (F6)...	1,147	Richards, (G4)...	554	Slaton, (D3)...	3,587	Waelder, (F5)...	1,018
Marathon, (C4)...	831	Oglesby, (F4)...	396	Richardson, (F3)...	720	Smiley, (F5)...	568	Waller, (G4)...	495
Marble Falls, (E4) 1,021		O'Donnell, (D3)...	1,187	Richland, (F4)...	369	Smithville, (F5)...	3,100	Wallis, (F5)...	550
Marfa, (B6)...	3,805	Oglesby, (F4)...	396	Richland Springs, (E4)...	541	Snyder, (D3)...	3,815	Wallisville, (G5)...	850
Marion, (E5)...	373	Olden, (E3)...	554	Richmond, (G5)...	2,026	Socorro, (A6)...	2,335	Walnut Sprs, (F3) 723	
Markham, (F5)...	440	Olmos Park, (E5) 1,822		Riesel, (F4)...	433	Somerset, (E5)...	550	Warren, (C4)...	440
Marlin, (F4)...	6,542	Olney, (E3)...	3,497	Ringgold, (E3)...	465	Somerville, (E5)...	1,621	Waskom, (H3)...	564
Marquez, (F4)...	381	Onalaska, (G4)...	1,375	Rio Grande City, (E6)...	2,511	Sonora, (G4)...	2,528	Weatherford, (F3) 5,924	
Marshall, (G3)...	18,410	Orange, (H4)...	7,472	Rio Hondo, (F6)...	804	Sourlake, (G4)...	1,504	Weimar, (F5)...	1,353
Mart, (F4)...	2,856	Orange Field, (H4)...	1,100	Riviera, (F3)...	515	South Bend, (E3)...	554	Wellert, (E3)...	519
Martindale, (F5)...	550	Orange Grove, (E6)...	906	Roanoke, (F3)...	485	South Houston, (G5)...	619	Wellington, (D2)...	3,308
Mason, (E4)...	1,250	Orin City, (G3)...	552	Roaring Sprs, (D3)...	514	South San Antonio, (E5)...	2,978	Wells, (G4)...	696
Matador, (D3)...	1,376	Oseco, (F3)...	442	Robert Lee, (D4)...	662	Southside Place, (G5)...	1,263	Weslaco, (E6)...	6,883
Matagorda, (G5)...	1,100	Otto, (F4)...	1,100	Robstown, (F6)...	6,780	Spearman, (D1)...	1,105	West, (F4)...	1,979
Mathis, (F5)...	1,950	Overton, (G3)...	2,313	Roby, (D3)...	904	Spring, (G4)...	660	Westbrook, (D3)...	563
Maud, (G3)...	550	Ozona, (D4)...	2,365	Rochelle, (E4)...	566	Springtown, (F3)...	770	West Columbia, (G5)...	1,573
May, (E4)...	454	Paducah, (D3)...	2,677	Rochester, (E3)...	611	Spur, (D3)...	2,136	Westhoff, (F5)...	560
Maypearl, (F3)...	377	Paige, (F4)...	513	Rockdale, (F4)...	2,136	Spur, (G4)...	554	West University Place, (G5)...	9,221
Meadow, (F3)...	408	Paint Rock, (E4)...	562	Rock Island, (F5)...	552	Stamford, (E3)...	4,810	West Vernon, (E2)...	955
Megargel, (E3)...	531	Palacios, (F5)...	2,288	Rockport, (F5)...	1,729	Stanton, (D3)...	1,245	Wharton, (G5)...	4,386
Melissa, (F3)...	412	Palestine, (G4)...	12,144	Rocksprings, (D4) 1,339		Steffenville, (E3) 4,768		Wheeler, (D2)...	848
Melvin, (E4)...	495	Palmer, (F3)...	697	Rockwall, (F3)...	1,318	Sterling City, (D4) 974		White Deer, (D2)...	733
Memphis, (D2)...	3,869	Panhandle, (D2)...	978	Roganville, (H4)...	664	Stinnett, (D2)...	635	Whitesboro, (F3)...	1,560
Menard, (F4)...	2,375	Paradise, (F3)...	572	Rogers, (F4)...	911	Stockdale, (F5)...	926	Whitewright, (F3) 1,537	
Mercedes, (F6)...	7,624	Paris, (G3)...	18,678	Roma, (E6)...	1,414	Stratford, (D1)...	877	Wichita Falls, (E3)...	45,112
Meridian, (F4)...	1,016	Parks, (E3)...	770	Ropesville, (C3)...	669	Strawn, (E3)...	1,107	Wiergate, (H4)...	1,100
Mertel, (F3)...	496	Park Springs, (F3)...	352	Roscoe, (D3)...	1,166	Streetman, (F4)...	392	Willis, (G4)...	904
Mertzon, (D4)...	869	Pasadena, (G5)...	3,436	Rosebud, (F4)...	1,842	Sudan, (C2)...	974	Wills Point, (G3)...	1,976
Mesquite, (F3)...	1,045	Pear Ridge, (G5)...	1,198	Rosenberg, (G5)...	3,457	Sugar Land, (G5)...	1,100	Winfield, (G3)...	691
Mexia, (F4)...	6,410	Pearsall, (E5)...	3,164	Ross City, (D3)...	662	Sulphur Bluff, (G3) 570		Wink, (C4)...	1,945
Miami, (D2)...	713	Pecan Gap, (G3)...	409	Rosser, (F3)...	385	Sulphur Springs, (G3)...	6,742	Winnboro, (G3)...	2,092
Midland, (C3)...	9,352	Pecos, (C6)...	4,855	Rotan, (D3)...	2,029	Sunset, (F3)...	695	Winona, (G3)...	388
Midlothian, (F3)...	1,027	Pelly, (G5)...	3,712	Round Rock, (F4) 1,240		Sweetwater, (D3) 10,367		Winters, (F4)...	2,335
Milano, (F4)...	550	Peniel, (F3)...	405	Rowena, (E4)...	568	Sylvester, (D3)...	405	Wolfe City, (F3)...	1,339
Miles, (D4)...	814	Perry, (F4)...	440	Roxton, (G3)...	990	Taft, (F6)...	2,686	Woodboro, (F3)...	1,426
Millford, (F3)...	767	Perryton, (D1)...	2,325	Royce City, (F3)...	1,190	Tahoka, (D3)...	2,129	Woodson, (E3)...	440
Millert, (E5)...	330	Petersburg, (D3)...	496	Rule, (E3)...	1,195	Talco, (G3)...	912	Woodville, (G4)...	1,521
Millsap, (E3)...	495	Petrolia, (E3)...	597	Runge, (F5)...	1,001	Tatum, (G3)...	427	Wortham, (F4)...	1,267
Millsap, (E3)...	495	Pharr, (E6)...	4,784	Rusk, (G4)...	5,699	Taylor, (F4)...	7,875	Wright City, (G3)...	555
Mincola, (G3)...	3,223	Phillips, (D2)...	3,300	Sabinal, (E5)...	1,768	Teague, (F4)...	3,157	Wythe, (F3)...	914
Mineral Wells, (E3)...	6,303	Pickton, (G3)...	556	Sabine, (G5)...	440	Tehuacana, (F4)...	408	Yantis, (G3)...	448
Mingus, (E3)...	570			Sadler, (F3)...	444	Temple, (F4)...	15,344	Yoakum, (F5)...	4,733
Mirando City, (E6)...	1,342							Yorktown, (F5)...	2,081
Mission, (E6)...	5,982							Zapata, (E6)...	560
Mobette, (D2)...	660								
Monahans, (C4)...	3,944								
Montgomery, (G4)...	550								
Moody, (F4)...	931								
Moore, (E5)...	385								
Morgan, (E3)...	710								
Morgan, (F4)...	303								

listening to the footsteps of the coming millions," he replied. His words were truly prophetic, for by 1900 the population had grown to 3,048,710.

Since 1901, when the famous Spindletop oil field was discovered, the population has more than doubled. Today, 81.9 per cent of the people are native white, including large numbers of Texas-born Mexicans. Only about 4 per cent of the white inhabitants are foreign-born. Most of these are Mexicans who labor on the farms and in the factories, chiefly in the south and southwest. Other foreign-born groups are German, Czechoslovakian, Italian, Russian, British, Canadian, and Polish, attracted by opportunities in the rapidly developing oil fields. Negroes make up 14.4 per cent of the population.

Agriculture. The great fertile area of Texas makes it one of the most important agricultural states. Each year, its ranches produce large quantities of livestock products, and millions of its acres yield rich harvests of white cotton and golden grain. While the northern states are blanketed with snow, its sun-drenched orchards bend low with ripening fruit, and its truck gardens are green with growing vegetables.

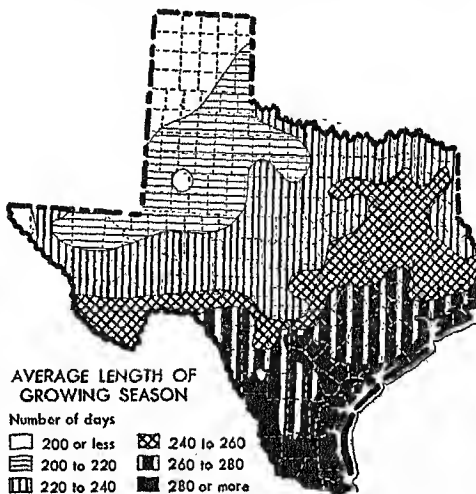
Cotton and Other Field Crops. From the beginning, it was "King Cotton" that lured most of the early settlers to the lands west of the Sabine and south of the Red River. It is said that Jared Groce, sometimes called the "Father of Texas Agriculture," and others introduced commercial cotton growing in the rich valley of the Brazos in the early 1820's. Today, Texas produces more than 12 per cent of the world's supply of cotton, nearly one fourth of all that grown in the United States, and more than twice as much as any other state. Cotton grows best in the Coastal Plains, and on the central and northern prairies, but there are only a few counties in which conditions are not favorable for its production.

Along the Gulf, the growing of rice is an important industry, in fields flooded by water pumped from wells, fresh-water lagoons, and streams. Texas usually ranks first among the southern states in the production of corn, more widely distributed than any other crop except cotton. It is used chiefly within the state as feed for cattle and hogs. Grain sorghums are raised most extensively in the Great Plains, where they furnish both grain and forage for livestock. Other important crops include wheat (grown especially in the north and northwest), oats, barley, rye, and hay. Broomcorn is raised, and peanuts are widely grown, especially for their oil and meal and for use in making plastics.

Fruits, Vegetables, and Nuts. Through irrigation, the once unproductive land bordering the lower Rio Grande has been turned into a "Magic Valley," one of the finest fruit belts in the United States. From its orchards train-

loads of grapefruit, oranges, lemons, kumquats, tangerines, and other citrus fruits are sent to northern markets. Other semitropical fruits, grown on a limited scale, include dates, avocados, guavas, and papayas. Watermelons, cantaloupes, and strawberries are also produced in this wonder valley; and blackberries in East Texas. Other fruits raised in the state include apples, peaches, grapes, plums, and pears.

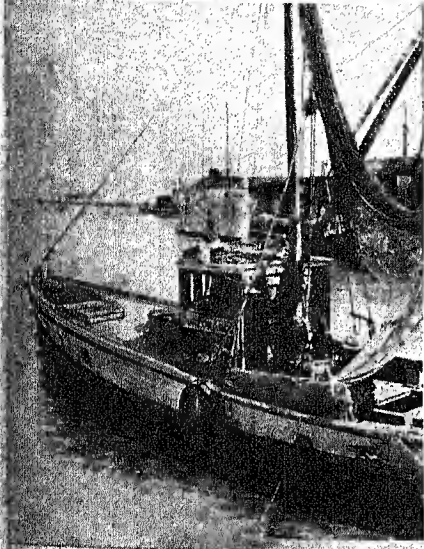
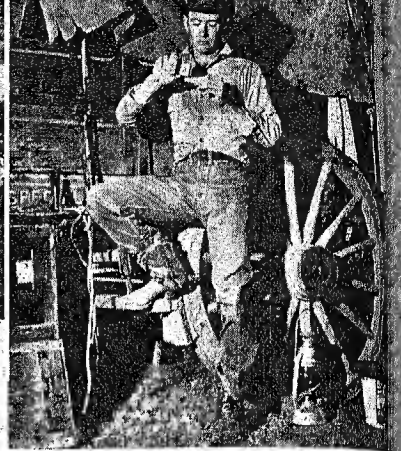
In Maverick, Frio, La Salle, Lavala, and Dimmit counties, truck farming is so productive



that this area is known as the "Winter Garden of America." Crystal City, shipping center for the district, is often referred to as the "Spinach Capital of the Nation." Large quantities of vegetables are also grown in the lower Rio Grande Valley and in the vicinity of Laredo, San Antonio, Corpus Christi, and Jacksonville and Tyler in East Texas. Among the chief truck crops are tomatoes, spinach, onions, cabbage, and potatoes.

Pecan trees border the streams throughout most of the state, except in the Great-Plains and Trans-Pecos areas. Many of the wild trees which were flourishing when the pioneers first came are still bearing. By grafting, the native pecan has been greatly improved, and groves of cultivated varieties have been planted. Today, the state produces about one half of all the pecans sold in the United States. Nuts from tung trees, grown especially in the southeast, furnish oil for use in making varnish and lacquer.

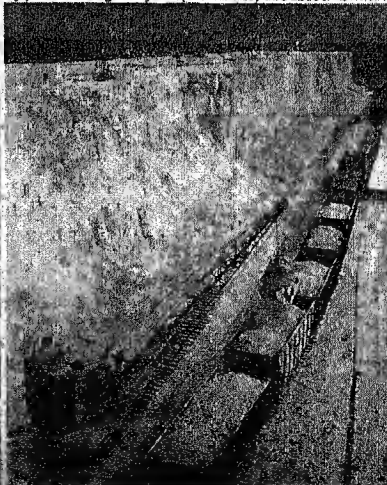
Irrigation and Dry Farming. Irrigation is not new in Texas. Near El Paso are ditches which were constructed and used for this purpose by an earlier race than the Indians. In 1940 there were more than one million acres of irrigated land, principally in the western part of the state, the Rio Grande and Pecos valleys, the section near Wichita Falls, and the coastal



TEXAS—A LAND OF VARIED INDUSTRIES

Upper left: A mule-drawn chuck wagon on an improved highway near Marfa. Such wagons, carrying a stove, provisions, and bedrolls, are sent with the cowboys when they work far out on the range. *Upper right:* A modern cowboy relaxing after the day's work. *Second left:* A fishing boat of the picturesque "Mosquito Fleet," which goes out from Galveston and other Gulf ports to bring in oysters, shrimps, and fish. *Second right:* Each year, ranchers brand the new calves born on the range so that there can be no doubt as to their ownership. The mounted cowboy is leading a roped calf to the branders. *Below left:* One of the West Texas flocks which help to make Texas the leading sheep- and wool-producing state. *Below center:* Loading sulphur at a Freeport mine. About 85 per cent of the United States production of this mineral comes from Texas. Forged to the surface in liquid form, it solidifies in large yellow-green mounds. *Below right:* A mechanical cotton picker at work in the cotton fields.

Photos: F.S.A.; Pix, Monkmeyer; Ewing Galloway; Texas Highway Department; Houston Chamber of Commerce; Southern Pacific



rice regions. In El Paso and Hudspeth counties, thousands of acres are made productive by water from Elephant Butte Dam (which see), more than 100 miles northward in New Mexico. In the Panhandle, shallow wells supply the life-giving water. In other sections, it comes from deep-flowing artesian wells, artificial lakes, or rivers. In parts of the Panhandle and the west-central section, where there is not enough rainfall for profitable farming, deep cultivation of the soil and other dry-farming methods are used. See IRRIGATION; DRY FARMING.

Cattle and Other Livestock. Generally speaking, the winters are so mild that livestock can graze in the open throughout the year. As a result, barns are not needed, and stock can be raised more cheaply than in the northern states.

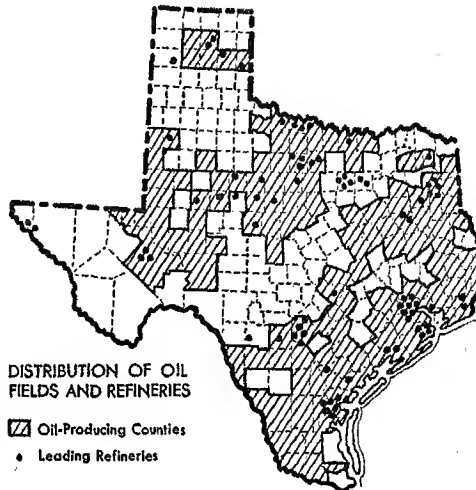
When the first Anglo-American settlers arrived, herds of longhorns—wild cattle descended from the stock introduced by Coronado in 1541—roamed the unfenced plains of the southwest. During the days of the republic (1836-1845), cowboys drove herds of these cattle to New Orleans for sale, along what later became known as the Beef Trail. From the close of the War between the States through the early 1880's, millions of longhorns were driven northward to the railheads for shipment to northern and eastern markets. Rounded up in the springtime, they fattened on the wild prairie grasses as they were herded along the trails by colorful cowboys in ten-gallon hats and high-heeled boots. The Chisholm Trail, extending from San Antonio northward across Oklahoma to Abilene, Kans., and the famous Western Trail, leading to Dodge City, Kans., were the most widely used.

This picturesque and historic era was doomed by the coming of the railroads, which made it possible to ship cattle to market direct from Texas. Homesteaders, arriving by train, bought small farms, and fenced them in with barbed wire. For years, occasional bloody fence-cutting "wars" were waged in the state. Enraged at losing their free pastures, some of the cattlemen cut the fences; others fenced in enormous tracts to which they had no claim. Great ranches, ranging in size from several thousand to more than a million acres, were built up. Shorthorns, crossed with the Brahma (from India) to make them immune to tick fever, gradually replaced the longhorns, and the quality of the herds was improved. Today, the white-faced Hereford is the most popular breed. See CATTLE; CATTLE TICK.

From the herds of mustangs or wild horses, descended from the animals brought in by the Spaniards, have been developed many excellent breeds. In addition to work horses for use on the farms, finesaddle and race horses, cow ponies, and polo ponies are raised. The demand for mules in the cotton fields has made mule raising important. Large numbers of hogs are raised.

The profitable sheep-raising industry may be traced back to the Spaniards, who introduced sheep before 1680. From Texas goats comes more than four fifths of all the mohair clipped in the United States. The favorite breed is the Angora, which grows an especially fine grade of white silky mohair used in upholstering automobiles and furniture. Most of the goats and sheep are raised on the rich and plentiful grasses of the Edwards Plateau.

Chickens and eggs are important sources of farm income, and turkeys by the tens of thousands are sent to market each year. The abundance of such flowering plants as catchlaw,



DISTRIBUTION OF OIL FIELDS AND REFINERIES

- ▨ Oil-Producing Counties
- Leading Refineries

huajillo, cotton, and alfalfa favors beekeeping. Texas produces more bees and honey than any other state except California.

Minerals. Even before the Spaniards arrived in what is now Texas, oil, salt, and a few other minerals were used by the Indians. Yet it was not until about the beginning of the twentieth century that the extent and value of the mineral resources of the state began to be fully realized. After that, new minerals were discovered, in many cases as a result of drilling for oil. Today, Texas leads the states in the total value of its mineral products.

Oil, Gas, and Helium. Oil, by far the most important of the many Texas minerals, was first discovered near Nacogdoches in 1866. But it was not until the opening of the Spindletop field in 1901 that oil began to be produced on a large scale. For several years, the Gulf Coast field around Beaumont was the chief center of the industry. Later, other fields, including those of north and central Texas, the Panhandle, and the Pecos Valley, were opened up. Then, in 1930, came the greatest discovery of all, the famous East Texas oil field, destined to become the largest in the world, with about 25,000 producing wells. Texas, estimated to

have more than one half of the crude-oil reserves of the entire United States, now produces more than one third of the annual output of the nation, and about one fourth of the world supply. Each year, hundreds of millions of barrels are sent from the state by pipe line, tanker, and tank car.

About 40 per cent of all the natural gas produced in the United States comes from Texas. Although it is found in all oil-producing regions, it sometimes occurs alone, as in the gas field north of Amarillo in the Panhandle. This field, one of the largest in the world, sends gas by pipe line even as far as Chicago, as well as into Mexico. Mixed with the natural gas found near Amarillo is helium. The plant owned and operated by the Federal Government in this section is the largest one in the world recovering and processing helium in commercial quantities. Large amounts of natural gasoline also come from the natural-gas fields of the state.

Salt and Sulphur. Salt was much in demand as a preservative in the days before refrigeration and canning were developed. As early as the sixteenth century, shiploads of salt, dug from the beds along the Rio Grande, were sent to Spain. It was still so important in 1877 that a dispute over the ownership of several salt lakes, about ninety miles northeast of the present-day town of San Elizario, resulted in an armed conflict, known as the Salt War. Today, Texas is one of the leading salt-producing states. The largest deposits are found in the salt domes of the Coastal Plains, in the undeveloped surface flats of the west, and in the lakes of the Staked Plain. Grand Saline, Palestine, and Corpus Christi are the chief producing centers.

The first Texas sulphur was mined near Freeport in 1912, and the state now furnishes about 85 per cent of the supply of the United States. Most of the greenish-yellow mineral comes from Wharton, Fort Bend, Brazoria, Matagorda, and Duval counties.

Other Minerals. There are large deposits of bituminous coal, found chiefly in the north-central and middle-western areas. These have scarcely been tapped, because the abundance of cheaper oil and gas makes mining unprofitable. Lignite, occurring in a broad belt in the coastal area extending from the Rio Grande to the Red River, is also little developed. Adding to the mineral wealth are valuable deposits of limestone, gypsum, asphalt, granite, graphite, marble, sandstone, fuller's earth, clay, sand, and gravel. Other minerals include potash, copper, silver, gold, iron, mercury, lead, manganese, zinc, basalt, tungsten, and uranium.

Manufactures. Texas is still in its infancy as a manufacturing state, but it is making more and more use of its raw materials. Oil refining, in which it ranks first among the

states, is by far the most important industry, accounting for more than 40 per cent of the value of all manufactures. There are more than one hundred refineries widely scattered throughout the state. The largest are along the Gulf coast, in such port cities as Beaumont, Port Arthur, Baytown, and Houston, from which the processed products can be shipped by water to various parts of the world. In addition to refining the "liquid gold" from its own wells, Texas processes large quantities of crude oil piped in from such other states as Louisiana, Arkansas, Oklahoma, and New Mexico. Carbon black, a coloring matter used in making paints, inks, and rubber products, particularly tires, is made from natural gas. About 80 per cent of the production of the United States comes from Texas, chiefly from the Panhandle.

A large plant in Corpus Christi produces chemicals used in making glass, steel, and other products; another, at Freeport, makes magnesium from sea water and slaked lime (produced by burning oyster shells). Other important industries include publishing and printing; the assembling of automobiles; the manufacture of cottonseed and peanut products, vegetable oils, brooms, cement, and clay products; the canning and preserving of fruits and vegetables; and the milling of flour and lumber. Connected with the lumber industry is the making of turpentine, especially at Hillister and Wiergate. Meat packing centers chiefly in Fort Worth, which boasts the largest stockyards south of St. Louis. Texas is second only to Louisiana in the cleaning and polishing of rice. A large sugar refinery is located at Sugar Land. A number of large smelters refine gold, silver, lead, copper, iron, and antimony. Coarse cotton textiles are manufactured on a small scale in several cities. There are several leather-tanning plants in the state, and a number of boot and shoe factories. The largest of these is at Fort Worth. Cowboy boots have long been manufactured in Texas, as has clothing for men, women, and children, made largely by Mexican workers.

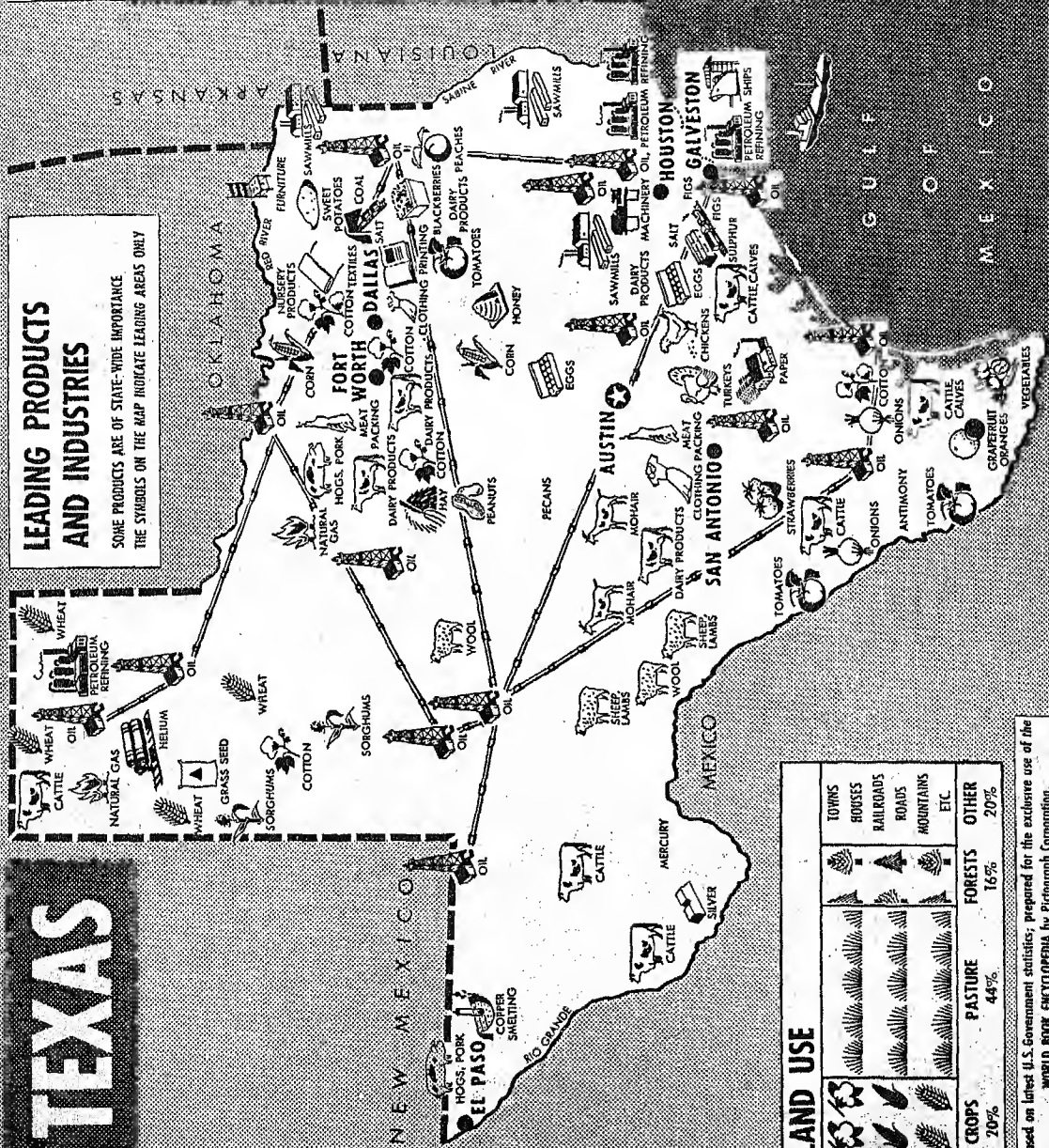
During World War II, munition and other war-supply plants were built in various parts of the state, and the first major steel mill of the state was erected on the bank of the Houston Ship Channel. Explosives were manufactured at Houston; airplanes at Dallas and Fort Worth; and ships at such ports as Houston, Orange, Beaumont, and Galveston.

Lumbering, the first large-scale industry to develop in Texas, reached its peak of production about 1910. Many of the dense forests of yellow pine which once covered the north-eastern part of the state have been cut, but the area still produces large supplies of timber and naval stores. Along its western edge are belts of hardwoods—principally oak, ash, elm,

TEXAS

LEADING PRODUCTS AND INDUSTRIES

SOME PRODUCTS ARE OF STATE-WIDE IMPORTANCE
THE SYMBOLS ON THE MAP INDICATE LEADING AREAS ONLY



LAND USE				
CROPS	PASTURE	FORESTS	OTHER	
70%	44%	16%	20%	

Based on latest U.S. Government statistics; prepared for the exclusive use of the
WORLD BOOK ENCYCLOPEDIA by Pictograph Corporation.

AVERAGE YEARLY VALUE OF LEADING PRODUCTS

EACH DISK REPRESENTS TO MILLION DOLLARS
DISKS REPRESENTING FACTORY PRODUCTS
INDICATE VALUE ADDED TO MATERIALS IN THE FACTORY



COTTON
CATTLE, CALVES, ETC
DAIRY PRODUCTS
CORN
HOGS AND PORK
WHEAT
EGGS



PETROLEUM
NATURAL GAS
SULPHUR
NATURAL GASOLINE



FACTORY (PLANTS AND MILLS)

PETROLEUM REFINING
OIL-FIELD MACHINERY
NEWSPAPERS AND PERIODICALS
SAWMILLS
MEAT PACKING
NON-ALCOHOLIC BEVERAGES
CEMENT
COTTONSEED PRODUCTS
FLOUR

hickory, maple, and walnut. In the east, moss-hung cypress trees grow in the dark swamps bordering the Trinity, Neches, and Sabine rivers. The stunted blackjack of the east-central region and the gnarled mesquite of the western plains are extensively used for firewood. One of the largest reserves of cedar in the United States is found in the hill country of central Texas.

Fisheries. Oysters, shrimps, and clams abound in the shallow waters along the coast, and are commercially valuable. The annual commercial catch of fish is more than 15,000,000 pounds, the chief species taken along the shore of the Gulf being Spanish mackerel, redfish, Gulf trout, rockfish, pompano, and mullet. Few deep-sea fish are caught for commercial purposes except the red snapper and the menhaden (used for oil and fertilizer).

Transportation. In early days, several famous trails crossed the Texas wilderness. Among these were the Chihuahua, a chief freight route into Mexico; the Comanche, used by the Indians in carrying out raids against the Mexicans; and the California Emigrant and Santa Fe, over which many pioneers traveled westward. During Spanish rule, *El Camino Real* (The Royal Highway) was the chief route of the monks and explorers in the Texas country. By 1860, there were more than thirty stage lines, the most important of which were the San Antonio-San Diego line in the south, and the Butterfield line, which crossed the northern section on its way to San Francisco.

Texas has more than 185,000 miles of highways, about 23,000 miles of which are state-improved. Of the more than thirty Federal highways, eight connect with roads in Mexico. Many passenger and freight bus companies operate in the state. Texas also has more than 22,000 miles of railroads (enough to extend almost around the world), ranking first among the states in track mileage. Yet there are sections of the state, especially in the extreme west, without railroad facilities. For a list of the railroads, see the colored map.

Undaunted by a lack of natural ports, Texas built them where they were needed. Houston, which is more than fifty miles inland, became a world port in 1915, by transforming Buffalo Bayou into a deep-water canal and constructing a large turning basin. For this reason, it is often referred to as the "city that fooled the geographers." A number of other inland cities have gained access to the sea by digging new channels or by deepening those of the rivers and streams which empty into the Gulf. Houston and Galveston are the chief cotton-shipping ports of the nation, and rank with New York and New Orleans as exporting centers.

The Intracoastal Canal is an important inland waterway paralleling the Gulf. It is designed to open up cheap barge service between

all Texas ports and the entire Mississippi and Ohio valleys.

Texas has commercial airports in most of its larger cities, and several seaplane anchorages. The airport at Brownsville is an important terminal for planes flying between the United States and Latin America. Favorable weather conditions and vast stretches of level land led the United States Army to locate Randolph Field, the "West Point of the Air," Kelly Field, and Brooks Field near San Antonio. For the same reason, the Navy chose Corpus Christi as the site of a major aviation-training station.

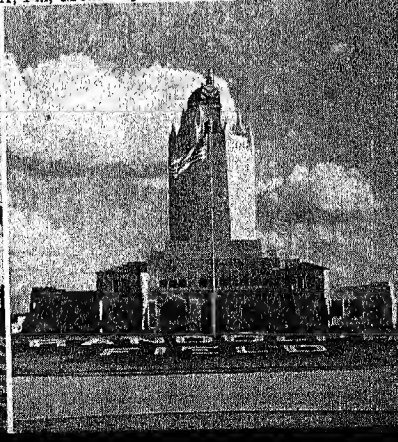
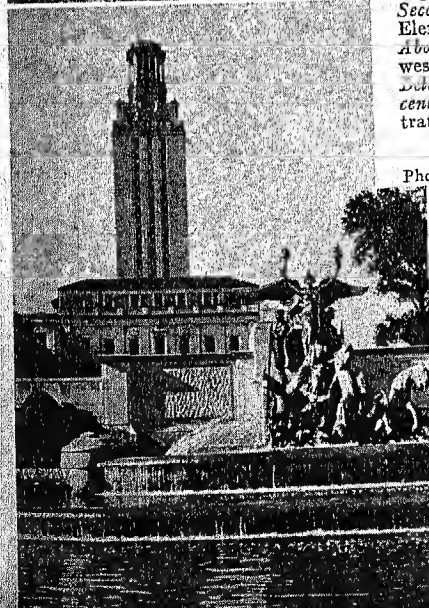
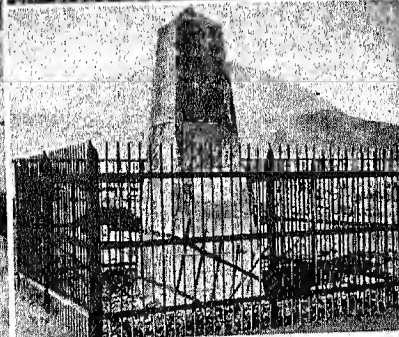
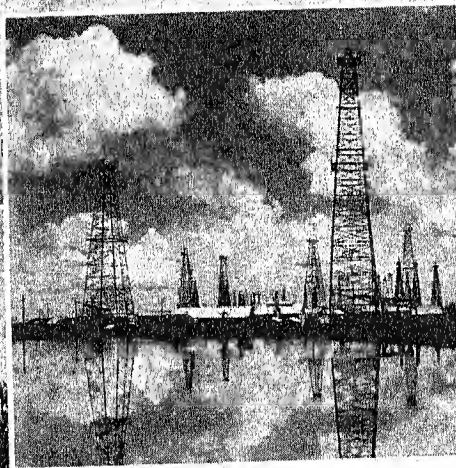
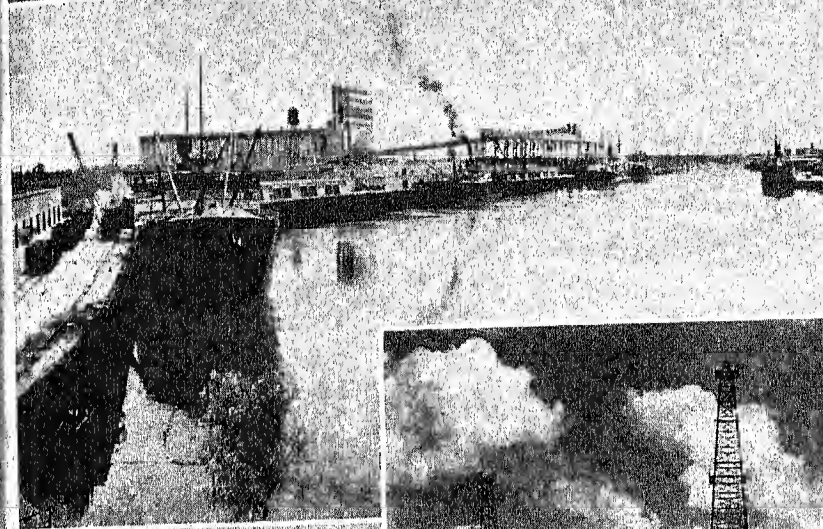
Press and Radio. *El Mejicano*, the first Texas newspaper, was published at Nacogdoches in 1813, for the purpose of stirring the colonists to revolt against Spain. But it was not until 1842 that the first modern newspaper, the *Galveston News*, was established. This pioneer and the *Dallas News*, which it founded in 1885, are among the oldest newspapers in Texas. Today, more than 700 newspapers and more than 100 periodicals are published. Among the former are a number of foreign-language, Negro, and labor papers. Since the first radio broadcasting station, WRR, was started in Dallas in 1920, more than fifty others have been established. Three regional radio networks operate in the state.

Social and Cultural Achievements

Educational Institutions: *State Teachers' Colleges*, Sam Houston at Huntsville, established in 1879; North Texas at Denton, 1890; East Texas at Commerce, 1894; Southwest Texas at San Marcos, 1903; West Texas at Canyon, 1910; Sul Ross at Alpine, 1920; Stephen F. Austin at Nacogdoches, 1923. *Other Colleges, Universities, and Seminaries*, Abilene Christian, Austin, Daniel Baker, Howard Payne, Incarnate Word, Mary Hardin-Baylor, McMurry, Our Lady of the Lake, Texas Dental, Texas Technological (state-controlled), and Texas Wesleyan colleges; Agricultural and Mechanical College of Texas, Texas College of Arts and Industries, Texas College of Mines and Metallurgy, and Texas State College for Women (all state-controlled); Baylor, Hardin-Simmons, St. Edward's, Southern Methodist, Southwestern, Texas Christian, and Trinity universities; St. Mary's University of San Antonio; University of Houston; University of Texas (state-controlled); Rice Institute; Austin Presbyterian and Southwestern Baptist theological seminaries, and Dallas Theological Seminary and Graduate School of Theology. *Negro Colleges*, Bishop, Prairie View State Normal and Industrial (state-controlled), Samuel Huston, Texas, Tillotson, and Wiley colleges; and the Houston College for Negroes (branch of the University of Houston).

State Welfare and Penal Institutions: *Children*, orphans' homes at Corsicana (white) and at Gilmore (colored); Waco State Home (crippled); school for the mentally deficient at Austin; correctional schools at Gatesville (boys) and at Gainesville (girls). *Physically handicapped*, Texas School for the Blind, Texas School for the Deaf, and Deaf, Dumb, and Blind Institute for Colored Youths at Austin; hospitals at Abilene (epileptics), San Angelo (tubercular patients), and at Kerrville. *Mentally handicapped*, hospitals at Austin, Big Spring, Rusk, San Antonio, Terrell, Wichita Falls, and Galveston. *Confederate Women's Home* at Austin. *Prisons*, central plant at Huntsville; prison farms at Hobby, Sugar Land, Brazoria, Sandy Point, Weldon, Otey, Snipe, and two at Huntsville (one for women; the other for invalid and tubercular prisoners). Mentally ill prisoners are treated at the Rusk State Hospital.

Education. During the mission period, Franciscan monks taught the Indians to farm, spin, and weave. As early as 1746, the first public school was opened in what is now San Antonio. In spite of this early start, there were only



A STATE OF MANY RICHES

Top: In the Panhandle, fields of golden wheat stretch for miles in every direction. *Second left:* The Houston Ship Channel and Turning Basin. *Second right:* Santa Elena Canyon in the Big Bend country. *Third left:* The State Capitol at Austin. *Above center:* Spindletop Oil Field, discovered in 1901. *Third right:* This monument, west of El Paso, marks the junction of Texas, New Mexico, and the Mexican Republic. *Below left:* The Littlefield Memorial Fountain at the University of Texas. *Below center:* Patio of the Spanish Governors' Palace, San Antonio. *Below right:* Anderson Air Force Station at Randolph Field, "West Point of the Air," near San Antonio.

Photos: F.S.A.; Ewing Galloway; Southern Pacific; P&A; Pix; Monkmeyer; San Antonio C of C

three public schools in the entire colony in 1834, and most of the children of the Anglo-American settlers were taught at home. So-called "cornfield" schools were held in the homes of those whose parents could afford to pay with farm produce for the services of a traveling teacher. Even in the more prosperous homes, however, classes met only when the weather made it impossible for the children to work in the fields. Since one of the American colonists' grievances against Mexico was the failure of that country to establish a general system of public education, the republic early set about to remedy this condition. In 1839, in response to the pleas of Mirabeau B. Lamar, the first public lands were granted for establishing a primary school in each county, and two colleges or universities. This was the beginning of the present county school funds, and of the endowment of the University of Texas, which owns about 2,000,000 acres and is largely supported by royalties from the oil and gas on its land. Although a uniform state school system was established in 1854, the basis of the present one was not laid until 1884. Free public schools for Negroes, who are educated separately, were first provided in 1871. Junior high schools began in 1912; vocational training and compulsory education for all children between the ages of eight and fourteen in 1915; and free textbooks in 1918.

Texas, with more than 6,500 common and independent school districts, boasts the second largest permanent school fund in the Union. Control of the public-school system is shared by the state superintendent of public instruction and the state board of education, composed of nine members appointed by the governor for six-year, overlapping terms. Among the leading colleges and universities are:

Agricultural and Mechanical College of Texas, College Station, near Bryan. Opened in 1876; state-controlled college for men; one of the largest of its kind in the world. Courses stressed include agriculture; animal husbandry; veterinary medicine; textile, petroleum, and other branches of engineering. Maintains three coeducational branches: North Texas Agricultural College at Arlington, John Tarleton Agricultural College at Stephenville, and Prairie View State Normal and Industrial College (for Negroes) at Prairie View.

Baylor University, Waco. Coeducational, founded in 1845, oldest university in Texas and one of the largest denominational (Baptist) schools in the South. Divisions include arts and sciences, law, music and fine arts, business, and education. Medical and dental colleges, a school of nursing, and Baylor Hospital are in Dallas.

Rice Institute, Houston. Opened in 1912, coeducational, and privately controlled. Science courses are stressed, especially those in civil, chemical, electrical, mechanical, and architectural engineering.

Southern Methodist University, University Park, near Dallas. Opened in 1915, coeducational and denominational (Methodist). Schools include law, engineering, theology, and music. Has one of the oldest public-speaking departments in the United States.

Texas Christian University, Fort Worth (since 1910). Founded in 1873 as Add-Ran (named after

its founders, Addison and Randolph Clark) Christian University, at Thorp Spring. Coeducational and denominational (Disciples of Christ). Stresses courses in theology and education.

University of Texas, Austin. Established in 1881, state-controlled, coeducational. Leading schools and colleges include law, engineering, education, pharmacy, and business administration. The medical branch, with John Sealy Hospital, is at Galveston; the Texas College of Mines and Metallurgy at El Paso; the W. J. McDonald Astronomical Observatory (operated jointly with the University of Chicago) near Fort Davis.

Religion. In the 1540's Fra Juan de Padilla, a member of the Coronado expedition, became the first Franciscan missionary to remain among the Indians. From about 1680 until 1794, the missions were the religious and cultural centers of Texas. Of the numerous establishments opened during that period, several are still in use. Throughout the colonial period, Roman Catholicism was the established religion. After the overthrow of Mexican rule, Protestant preachers and missionaries began to carry their religion to the frontiersmen. Today, there are more than 11,000 churches in the state. The Baptists lead in membership, with Roman Catholics, Methodists, Disciples of Christ, Lutherans, and Presbyterians following in the order named. A majority of the Negroes are Baptists or Methodists.

Libraries. Texas has more than ninety-five public-library systems. Traveling bookmobiles, operated by a number of counties and cities, supply library facilities to many rural areas. Included among the more important public libraries are those at Houston, Dallas, Fort Worth, Galveston, and San Antonio. Chief among the university libraries and largest in the South is that of the University of Texas, with more than 650,000 volumes. The Browning and Texas collections of Baylor University are especially noted.

Arts and Crafts. Music was introduced into Texas by the missionaries, who taught the Indians to sing, and even to play the harp, violin, and guitar. Later, Mexicans, Negroes, Germans, French, and cowboys each made their own unique individual contributions to the field of music. Many of the stories of William Sidney Porter (O. Henry) were written during the years he spent in the state, and have a Texas background. Several Texans have won fame in the motion-picture industry. Of the numerous little-theater groups, that at Dallas, founded in 1927, is best known. Adding color to the cultural life of the state are the fiestas, dances, and musical compositions of the Mexicans in such cities as San Antonio and El Paso. Their artistic handicraft products, including pottery, glassware, hand-tooled leather, weaving, and hand-made furniture, are in great demand. Architecture has been deeply influenced by the Spanish-colonial style, of which there are such noteworthy examples as the restored Mission

San José and Governors' Palace at San Antonio. The long, one-story ranch house, once common in the San Antonio area, is a model for modern builders.

Social Welfare. Progressive social legislation includes a workmen's compensation act, passed in 1913, and provision for child-welfare work, vocational rehabilitation, a state employment service, unemployment compensation, teacher retirement, and old-age assistance. Since 1925, children under fifteen have been prohibited from working in any laundry, factory, mill, workshop, or in messenger service in towns of more than 15,000 population. The Hogg Foundation for Mental Hygiene does outstanding work. Many educators regard the Educational Division of the State Department of Public Health as one of the best organizations for educational research in the United States. Among its outstanding studies are those on the relationship of diet, lighting, textbooks, and curriculum to the health of the pupil.

Recreation and Out-of-Doors

Resort centers along the coast, such as Galveston and Corpus Christi, are favorite haunts of deep-sea fishermen in search of sailfish, marlin, and tarpon. Hunting is excellent, especially on the Edwards Plateau and along the Big Bend of the Rio Grande. Dude ranches, reminders of the Old West, are popular. In the western ranch country, rodeos, with their exciting riding and roping contests, often last for days.

State Parks and National Forests, comprising about 2,000,000 acres, have been set aside in various sections. The national forests are Angelina (139,369 acres), near Rockland; Davy Crockett (160,891 acres), near Crockett; Sabine (184,368 acres), near San Augustine; and Sam Houston (156,056 acres), near Coldspring. All were created in 1936. The state parks include:

Balmorhea (360 acres), near Balmorhea. Recreational center, with the world's largest walled swimming pool, using 26,000,000 gallons of water daily from the San Solomon Springs. Created, 1934.

Bastrop-Buescher (3,830 acres), near Bastrop. Densely forested, scenic recreation center and wild-life preserve. Created, 1933.

Big Bend (225,000 acres), near Marathon. Last great wilderness of Texas, a semiarid region of magnificent mountain scenery and canyons, bordered on the south by the Big Bend of the Rio Grande. Created, 1933; authorized as a national park in 1935, pending certain fulfillments.

Caddo Lake (35,432 acres), near Karnack. Large natural lake among cypress swamps; boating and fishing. Created, 1933.

Davis Mountains (2,138 acres), near Fort Davis. Picturesque Indian lodge, in the heart of the mountains; jagged cliffs and valleys; beautiful Limpia Canyon. Created, 1933.

Fort Parker (1,496 acres), near Mexia. Restoration of an old fort, site of an Indian massacre in 1836. Created, 1935.

Longhorn Cavern (636 acres), near Burnet. Contains the largest underground cavern in Texas, once a hiding place for Indians and criminals. Created, 1932.

Mother Neff (256 acres), near McGregor. Oldest state park in Texas. Created, 1923.

Palmetto (320 acres), near Luling. Jungle of swamps, floating islands, and subtropical plants; sulphur springs and geysers. Created, 1934.

Palo Duro Canyon (15,103 acres), near Canyon. Multicolored gorge more than 800 feet deep; once an Indian camping ground and southern end of the Dodge City Trail. Created, 1933.

Stephen F. Austin Memorial (671 acres), San Felipe. Remains of Austin's first colony, containing a reproduction of his old log cabin, and the site of the town hall in which the Texas revolution was planned. Created, 1940.

Other Places to Visit include the restorations or remains of the famous old missions, such as those at Goliad and those near San Antonio. The following are also of interest:

The Alamo, San Antonio. One of the most hallowed historic shrines in the state. See ALAMO.

Botanic Gardens, Fort Worth. Has a Garden Center with a library and other facilities for the use of students of the natural sciences, and the Albert Ruth Herbarium, with a large collection of dried plants.

Brackenridge Park, San Antonio. Beautifully landscaped recreational center of more than 300 acres. Contains the Witte Memorial Museum, with its interesting exhibits of cave-dweller and early Texas relics; the Pioneer Memorial Building; a reptile garden; a large zoo; a Mexican village; and a sunken-garden theater.

Fair Park, Dallas. Site of the expositions of 1936 and 1937, containing museums of natural history, fine arts, natural resources, and horticulture; the Texas Hall of State, with its statues of famous pioneers; an aquarium; and other buildings of interest.

Fort Bliss, El Paso. One of the two cavalry posts of the United States Army. Created, 1848.

Fort Sam Houston, San Antonio. One of the largest army posts in the United States. Created, 1876.

Governors' Palace, San Antonio. Restored Spanish-colonial building, believed to have been the home of early Spanish governors. Has furnishings and relics of the Spanish period; a landscaped patio.

King's Ranch, near Kingsville. Largest ranch in the United States, comprising about 1,250,000 acres.

La Villita, San Antonio. Restoration and reconstruction of a Mexican community, preserving and re-creating the Spanish culture of earlier days.

McDonald Observatory, on Mount Locke near Fort Davis. Third largest astronomical observatory in the world.

Museum of Fine Arts, Houston. Houses many rare works of art, including jewelry of ancient Greece, Spanish sculptures of the fifteenth century, and Persian textiles.

Old Land Office Building, Austin. Erected in 1857, it housed important early documents; now contains two interesting museums.

Sam Houston Shrine, Huntsville. Home of the Texas hero and his old log law office. Nearby are the Sam Houston Memorial Museum and his grave.

San Jacinto Battlefield, near Houston. A memorial more than 500 feet high marks the spot where General Houston and about 800 patriots defeated Santa Anna's army in 1836.

Sea Wall, Galveston. A seventeen-foot-high wall of steel-reinforced concrete, protecting the city from tidal waves and serving as an amusement center. A long pleasure pier, extending into the Gulf, and a fine beach help to make Galveston a popular resort city. On the bay side is the busy, colorful harbor.

Texas Memorial Museum, Austin. On the campus of the University of Texas. Fine collection of exhibits pertaining to history, zoology, botany, geology, and anthropology.

Government

National: Electoral votes, 23. Representatives in Congress, 21.

State: Senators, 3; representatives, 150. *Capital*, San Felipe de Austin, Washington-on-the-Brazos, Harrisburg, Galveston, Velasco, and Columbia, in consecutive order during the revolution, 1835-1836; Houston, 1837-1839; Austin, 1839; Houston, Washington-on-the-Brazos, 1842-1845; Austin since 1845.

Texas is governed under the constitution adopted in 1876. Earlier constitutions include those of 1843, 1861, 1866, and 1869. An amendment may be proposed by two thirds of the members of each house of the legislature, but becomes effective only when approved by a majority of the voters.

Executive officers consist of a governor, lieutenant governor, secretary of state, comptroller, treasurer, attorney general, commissioner of the general land office, three railroad commissioners, commissioner of agriculture, and superintendent of public instruction. Each of these officials except the secretary of state (who is appointed by the governor) and the railroad commissioners (elected for six years) is elected by the people for a two-year term. The governor has extensive powers, including that of appointment of various officials, boards, and commissions. He may also veto separate items in appropriation bills.

Legislative power is vested in a senate, the members of which are elected for four years, and a house of representatives, elected for two years. Both houses meet in regular biennial sessions, opening in odd-numbered years.

Judicial decisions are made by the supreme court, court of criminal appeals, courts of civil appeals, and district courts. Commissions of appeals assist the supreme court and the court of criminal appeals. There are also county, commissioner, and other minor courts. With the exception of the commissions of appeals, the entire judiciary is elective. District judges are chosen for four years; members of the higher courts for six-year overlapping terms.

Local Government operates with the county as the unit. The state is divided into 254 counties. The commission form of city government, originated at Galveston in 1901, has been widely adopted in all parts of the country.

National Politics is less complicated than in many other states. Except in the state elections of 1859, during the Reconstruction Era, and in the presidential election of 1928, the Democratic party has been politically dominant throughout Texas history. (See *POLITICAL PARTIES* [chart]). The state has given the nation one vice president—John Nance Garner—and a number of other political leaders, including Colonel Edward M. House and Jesse H. Jones.

Famous Texans

Many famous Texans have separate biographies (see *Biographies* in the list of related subjects at the end of this article). Others who

have achieved state, national, or international fame include:

Austin, Moses (1761-1820), born at Durham, Conn. Merchant and mine owner who planned the founding of Anglo-American colonies in Texas.

Coke, Richard (1820-1897), born at Williamsburg, Va. Governor of Texas, whose election marked the end of the Reconstruction Era in the state; father of the present Texas constitution.

Goodnight, Charles (1836-1929), born in Macoupin County, Ill. First settler and cattleman in the Panhandle. With John Adair, a wealthy Irishman, he owned the JA Ranch, comprising more than one million acres.

Hays, John [Jack] C. (1817-1883), born at Little Cedar Lick, Tenn. Won fame as a captain in the Texas Rangers and as a fighter against the warring Comanches.

Hogg, James Stephen (1851-1906), born near Rusk. First native governor; leader in securing reform legislation against the railroads and trusts; father of the Texas Railroad Commission.

Jones, Jesse Holman (1874-), born in Robertson County, Tenn. Rose to prominence as a Texas lumberman, banker, real-estate developer, and publisher. Went to Washington as director of the Reconstruction Finance Corporation in 1932; became head of the Export-Import Bank (1936), Federal Loan Administrator (1939), Secretary of Commerce (1940), a member of the Supply Priorities and Allocation Board (1941), and a member of the War Production Board (1942).

King, Richard (1825-1885), born in Orange County, N. Y. Founder of the famous King Ranch.

Lamar, Mirabeau B. (1798-1859), born in Warren County, Ga. Second president of the Texas Republic, and one of its first writers and poets; largely responsible for the establishment of the first uniform public-school system.

Long, Jane (1798-1880), born in Charles County, Md. Heroine of pioneering days, often called the "Mother of Texas." Aided only by a Negro servant girl, Mrs. Long held a rude outpost against raiding Indians and withstood other untold hardships during the severe winter of 1821-1822.

Milam, Benjamin, (1791-1835), born in Kentucky. Frontiersman, killed while leading the Texas revolutionists to victory against the Mexicans at San Antonio.

Ney, Elizabeth (1833-1907), born in Münster, Germany. Distinguished sculptor, credited with introducing art education into Texas. Her old studio in Austin is now a museum.

Parker, Quanah (1845-1911), born in northern Texas. Famous Comanche Indian chief, who led repeated raids against the white settlers and soldiers.

Travis, William Barret (1809-1836), born near Red Banks, S. C. Lawyer who gave his life while commanding the patriots at the Alamo.

State Symbols and Events

State Seal: Within the inner circle is a five-pointed star surrounded by branches of live oak and olive, signifying strength and peace.

State Flag: See UNITED STATES OF AMERICA (color plate, Flags of the States).

State Motto: Friendship.

State Bird: Mockingbird. See BIRDS (color plate, State Birds).

State Flower: Bluebonnet. See FLOWERS (color plate, Prairie Flowers).

State Tree: Pecan.

State Song: "Texas, Our Texas." Words by Gladys Yoakum Wright and William J. Marsh; music by William J. Marsh.



Annual State Events. Among the interesting events on the state calendar which attract many visitors are:

Texas Citrus Fiesta, Mission, first week in January.
Charro Days, Brownsville, week end before Lent.
Texas Week, state-wide, week of March 2; *Texas Independence Day*, *Sam Houston Day*, and *Texas Flag Day*, March 2.

Southwestern Exposition and Fat Stock Show, Fort Worth, nine days, beginning second Friday in March, with world-championship contests in roping and riding.

Fiesta de San Jacinto, San Antonio, week of April 21.

San Jacinto Day Celebration, Houston, April 21.

Texas Relays, Austin, in April (no fixed date).

Fishing Rodeo, Galveston, in June or July.

Cowboy Reunion, Stamford, three days in July, including the Fourth.

Texas Pioneers' Day, state-wide, August 12.

Rio Grande Valley Fishing Rodeo, Port Isabel, August 17-20.

State Fair, Dallas, in October (no fixed date).

Father of Texas Day, state-wide, November 3.

Cowboys' Christmas Ball, Anson, Christmas Eve.

Sun Carnival, El Paso, last three days of December.

In addition, a Turkey Trot is held at Cuero in November, but usually only every other year.

History

- 1519 De Pineda explored the Texas coast.
- 1528 De Vaca shipwrecked on the coast of Texas.
- 1541 Coronado marched across part of Texas.
- 1542 De Soto's men reached Texas.
- 1680-1683 Missions and settlements established in the vicinity of El Paso.
- 1685 La Salle founded a French settlement on the shore of Matagorda Bay.
- 1690 First mission established in East Texas.
- 1691 Texas recognized as a province of Spain.
- 1716 A mission established at what is now Nacogdoches.
- 1718 A mission established at present-day San Antonio.
- 1749 A mission and *presidio* (Spanish military post) founded at present-day Goliad.
- 1821 Texas became a Mexican state. Stephen F. Austin established his colony at San Felipe de Austin.
- 1826-1827 Hayden Edwards and a group of Anglo-American settlers made an unsuccessful attempt to establish an independent Republic of Fredonia.
- 1836 Texas declared its independence from Mexico; the Alamo fell; Texans were massacred at Goliad; Houston defeated Santa Anna at San Jacinto; Texas became an independent republic.
- 1845 Texas admitted to the Union.
- 1848 The Rio Grande established as the southern boundary of the state and of the United States.
- 1851 Construction of first railway (Buffalo Bayou, Brazos, and Colorado) begun. Completed from Harrisburg to Alleyton in 1860.
- 1861 Texas seceded from the Union.
- 1865 Last battle of War between the States fought at Palmito Hill.
- 1870 Texas readmitted to the Union.
- 1901 Spindletop oil field discovered.
- 1915 Houston Ship Channel opened to traffic.
- 1924 Texas elected a woman governor (Mrs. Miriam A. Ferguson), the second state to do so.
- 1936 Texas Centennial Exposition celebrated one hundred years of independence.
- 1942 Large numbers of recruits for World War II, especially fliers trained at San Antonio, Corpus Christi, and other military-training centers.

Indian Days. When the first Europeans arrived, they found many Pueblo Indians dwelling in adobe houses near what is now El Paso. There were also several tribes of mound builders

in the eastern and northeastern part of the present state. The warlike Apaches made their homes on the Edwards Plateau, and the Comanches roamed the northern plains.

Exploration and Settlement. Driven by the relentless quest for "glory, God, and gold," the Spaniards began the exploration of Texas only twenty-seven years after Columbus landed on San Salvador. In 1519 Alonso Alvarez de Pineda, a Spaniard, explored and mapped the Gulf coast. Nine years later, Alvar Núñez Cabeza de Vaca and three Spanish companions were shipwrecked on Galveston Island, but eventually made their way overland to the Pacific coast. In 1541 Coronado, in search of the famous Seven Golden Cities of Cibola, marched across part of Texas. In the following year, a group of De Soto's men reached Texarkana, and in 1582 Antonio de Espejo, after exploring the Big Bend country and the Pecos Valley, established a mission near present-day El Paso. Upon these and similar explorations, Spain based its claims to the region north of the Rio Grande.

The French entered the struggle for possession of the Texas country in 1685, when La Salle founded a colony (Fort St. Louis) on the shore of Matagorda Bay. Spurred on by this threat, the Spaniards continued to explore. By 1731, they had sent more than ninety expeditions into the region and had established several missions—the first outposts of civilization in Texas. Some of these were protected by military forts. But Spanish colonization was slow, and from 1712 to 1803, the region was alternately under the control of France and Spain. The center of the Spanish government was San Antonio de Bexar (now San Antonio), where a mission and military post were established in 1718. The only other settlements of importance were at what is now Nacogdoches, where a Franciscan mission was founded in 1716, and at present-day Goliad, where a mission and *presidio* were opened in 1749.

Americanization and Independence. After the purchase of the Louisiana Territory from France in 1803, the United States claimed the territory as far south as the Rio Grande. In 1819, however, the claim was abandoned, and the Sabine River was made the southwestern boundary of United States territory.

After Mexico gained its independence from Spain in 1821, Texas became a Mexican state. The year before, Moses Austin had secured permission from the Mexican Government to establish an Anglo-American colony in Texas. Upon his death, his plans were carried out by his son, Stephen F. Austin, whose first settlement, San Felipe de Austin, was established near the mouth of the Brazos late in 1821. During the next few years, he and other colonizers brought in so many settlers that there were more than 20,000 Anglo-Americans in the province by

1830. Alarmed by their numbers, Mexico not only forbade further American immigration, but also began to pass laws displeasing to the settlers. The colonists, whose ties were naturally closer with the United States than with Mexico, were so angered that they revolted.

After a number of armed clashes, the Texans met at their capital, San Felipe de Austin, and organized a provisional government in 1835. On March 2 of the next year, at Washington-on-the-Brazos, they issued a declaration of independence. David G. Burnet was chosen provisional president, and Sam Houston became commander in chief of a colorful group of frontier fighters, struggling to drive out the Mexicans. Between February 23 and March 6 occurred the memorable siege of the Alamo at San Antonio, where all the American defenders who had taken refuge in the old Spanish mission chapel were killed. In the latter month, more than three hundred colonists led by Colonel James W. Fannin, Jr., were massacred at Goliad. Rallying to the battle cries of "Remember the Alamo" and "Remember Goliad," the Texans prepared to continue the fight. On April 21 Santa Anna, the Mexican President and general, was overwhelmingly defeated and captured at San Jacinto by a small force of Texans under Sam Houston. This victory made possible the Americanization of Texas and the completion of the work begun by the Austins.

The Texas Republic. Free from Mexico, the Texans established an independent government, with Houston as president. The young republic was financially weak, and constantly threatened by raiding Indians and Mexicans. In 1841 it tried to extend its power westward by sending troops into New Mexico, but the Santa Fe expedition ended disastrously. Meanwhile, Texas was courted by several of the great European powers, especially France and Great Britain. Both hoped to keep the republic independent and thereby prevent the United States from expanding to the southwest. Its value as a source of cotton supply was also recognized by the British. The Texans themselves were eager to belong to the United States, but ran into unexpected difficulties. Although the South clamored for its admission, the North opposed it, fearing annexation of another slave state.

Progress as a State. On December 29, 1845, after a long controversy over the slavery question, Texas was formally admitted to the Union as the twenty-eighth state. The conditions included (1) that the state should retain its unappropriated and vacant land; (2) that new states not to exceed four in number (in addition to Texas) might be formed within its boundaries; and (3) that the United States should settle all questions of boundary with foreign countries. Mexico had not acknowledged the independence of Texas; consequently, its annex-

ation brought on the war with Mexico, in 1846. At the end of that conflict, the Treaty of Guadalupe Hidalgo, signed in 1848, made the Rio Grande the southern boundary. In spite of strong Union sentiment in some sections, Texas joined the Confederacy in the War between the States. In 1866, after the close of the war, a new constitution abolishing slavery and renouncing states' rights was adopted. It was not acceptable to Congress, however, and in 1867 Texas was placed under military government. Another constitution was adopted in 1869, and the following year the state was readmitted to the Union. Since then its growth and prosperity have been remarkable. In 1874 the Comanches, the last of the warring Indians, were forced to live on a reservation in what is now Oklahoma. Leading the final campaign against these Indians who had raided the frontier for years, hindering white settlement, was General Ranald S. Mackenzie of the United States Army. By his victory he put an end to the bloody Indian warfare.

After the discovery of its oil fields about 1900, Texas began to boom. "Wild and woolly" cow towns and sleepy trading villages in the cotton country grew into large cities. Newcomers came to make their homes in the state, and many rural Texans moved into the industrial centers. Oil refineries, factories, and mills sprang up. Ports were improved, and a thriving foreign trade was developed. During World War I, more than 200,000 Texans were in service, and several of the largest training camps of the United States were located in the state. In 1936 the state commemorated its one hundred years of independence by holding the Texas Centennial Exposition, centered at Dallas. The fair was expanded in 1937 as the Greater Texas and Pan-American Exposition, blending the colorful and romantic histories of the Americas. With the outbreak of World War II, Texas provided not only men and sites for training fields, but also vast supplies of oil, gasoline, and other products needed in modern warfare.

B.F.P. (revised by W.P.W.)

Related Subjects. The reader is referred to:

CITIES

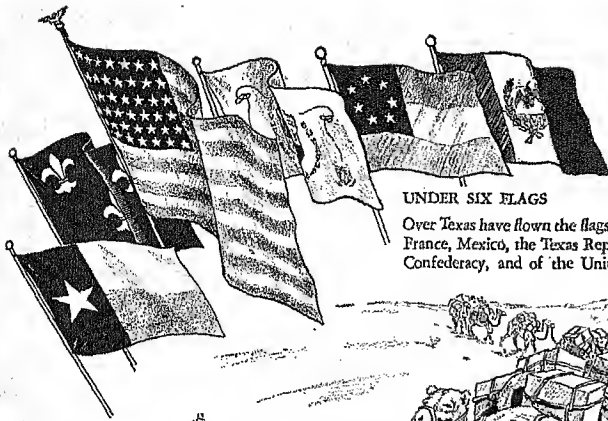
Austin	El Paso	Houston
Beaumont	Fort Worth	San Antonio
Dallas	Galveston	Waco

HISTORY

Alamo	Taylor, Zachary
Guadalupe Hidalgo, Treaty of	(In the Mexican War)
Louisiana Purchase	Texas Rangers
Mexican War	Trails of Early Days
Pioneer Life	Tyler, John
Santa Anna	(Administration)

BIOGRAPHIES

Austin, Stephen Fuller	Garner, John Nance
Barr, Amelia E. H.	House, Edward Mandell
Bowie, James	Houston, Sam
Crockett, David	Porter, William Sidney
Ferguson, Miriam A.	Reagan, John Henninger



UNDER SIX FLAGS

Over Texas have flown the flags of Spain, France, Mexico, the Texas Republic, the Confederacy, and of the United States.

MEMORABLE TEXAS EVENTS

TEXAS "LONGHORNS"

Between 1867 and 1880, thousands of "longhorns," descendants of cattle introduced by the Spaniards, were driven northward along the Western Trail to Dodge City, Kan., and shipped to eastern markets.

AN EXPERIMENT WITH CAMELS

In 1856, camels brought in by Secretary of War Jefferson Davis were landed at Indianola for use in transporting supplies to army posts in desert areas of the Southwest.



FOUNDING OF THE REPUBLIC

At Washington-on-the-Brazos, on March 2, 1836, duly-elected delegates met to declare the independence of Texas from the Republic of Mexico.

ORIGIN OF THE "LONE STAR"

The Lone Star was used on a flag by Americans operating in Texas even as early as 1819, and on one designed by Joanna Troueman in 1835. In March, 1836, at Washington-on-the-Brazos, it was officially adopted as the emblem of Texas.



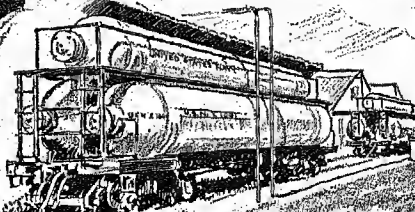
PRODUCTION OF HELIUM

Near Amarillo is the largest plant in the world producing helium gas in commercial quantities. The gas was first produced in quantity during World War I for use in balloons and dirigibles.



REMEMBER THE ALAMO!

In 1836, at the Alamo in San Antonio, 183 heroic Texans gave their lives for Texas independence. From February 23 until March 6, they held at bay a Mexican army of more than 4,000.



LEADING PRODUCTS

Cattle	Honey	Petroleum	Sorghum
Corn	Lumber	Pine	Sugar
Cotton	Mohair	Poultry	Sulphur
Goat	Mule	Rice	Turkey
Grapefruit	Natural Gas	Salt	Wheat
Helium	Pecan	Sheep	Wool

RIVERS

Brazos River	Pecos River	Rio Grande
Candian River	Red River	Sabine River
Colorado River		

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- DOBIE, JAMES FRANK. *A Vaquero of the Brush Country*. Grosset, 1936. Interesting story of the cowboy and ranger era.
- KREY, LAURA. *On the Long Tide*. Houghton, 1940. Story of the struggle for independence.
- PLENN, JAL E H. *Saddle in the Sky, the Lone Star State*. Bobbs, 1940. History, social life, and politics.

Texas, a Guide to the Lone Star State. Hastings House, 1940. (American Guide series.) Excellent and complete treatment of the subject.

Texas Almanac and State Industrial Guide. A. H. Belo Corporation, latest edition. A comprehensive reference book on Texas.

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Books for Younger Readers

- BARKER, EUGENE C. *The Father of Texas*. Bobbs, 1936. Interesting life of Stephen F. Austin.
- DRIGGS, HOWARD R. and KING, SARAH S. *Rise of the Lone Star*. Stokes, 1936. Early history of the state as told by pioneers.
- HEVLIGER, WILLIAM. *Wildcat*. Appleton-Century, 1937. Story about a Texas oil field.
- HUBBARD, MARGARET A. *Seraphina Todd*. Macmillan, 1941. Life in the Spanish missions.
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QUESTIONS ON TEXAS

(An Outline suitable for Texas will be found with the article "State.")

How does Texas compare in size with Rhode Island (1,214 square miles in area)? How does it compare in population with New York City, the largest city in the Union? What bearing do these facts have on the future of Texas?

In what way does each of the following indicate the vast extent of Texas: climate; character of the land; types of soil; and variety of crops, of industries, and of mineral resources?

Into what four great natural regions is Texas usually divided? How do these differ in (a) temperature; (b) rainfall; (c) industries?

Why does Texas afford such a good location for army and navy air-training stations?

Why did the admission of Texas to the Union bring on war between the United States and Mexico? What was definitely decided by the Treaty of Guadalupe Hidalgo?

For what reasons do Texans revere the memory of Stephen F. Austin, Sam Houston, David Crockett?

What important part did the following play in Texas history: the Alamo, San Jacinto, Goliad, Jack Hays, cornfield schools, longhorns, barbed wire?

What did Robert E. Lee mean when he said, during a visit to Texas in 1852, "I am listening to the footsteps of the coming millions"?

Why was the growth and development of the state comparatively slow until 1900, and so rapid after that date?

To what does each of the following terms apply, and what does each mean: "Magic Valley," "city that fooled the geographers," "Winter Garden of America," "West Point of the Air"?

Why did Texas develop into a leading agricultural state? A leading mineral state?

How does the cattle industry today differ from that of the period immediately following the War between the States?

Where is the citrus belt? What is its importance to the United States and Canada?

In what parts of the state are the irrigated areas? What is the average annual rainfall for each?

How are the following Texas products of world-wide importance: sulphur, helium, aviation gasoline?

Why are many of the large oil refineries located along the Gulf coast?

What conditions favor a great industrial future for Texas?

How is it possible that the United States may sometime have more than forty-eight states without enlarging its present boundaries?



Photo: Brown Bros.

THE TEXAS RANGER RIDES AGAIN

The modern Texas Ranger uses a high-powered automobile, a trailer in which to transport his horse and bloodhound aids, and a radio to receive the instructions of his commanding officer. When he reaches too rugged country, he saddles his horse and, with the dogs, continues the hunt for border smugglers and other law evaders. Coast Guard planes frequently transport him to places where local peace officers need his aid.

TEXAS FEVER TICK. See ZOOLOGY (How Zoology Affects Human Welfare); **CATTLE TICK.**

TEXAS RANGERS, originally a body of mounted riflemen, organized officially in 1835 on the outbreak of the Texas Revolution. Twelve years prior to that date, however, "Ranger" bands, which Stephen F. Austin (which see) had formed, were active in protecting American settlers along the Brazos River from Indian warriors and Mexican desperadoes. After the Revolution, they maintained law and order and guarded the Texas-Mexican border.

During the early turbulent years of the state's history, the Texas Rangers were recruited locally and numbered more than 1,500. In 1874, when the menace of Indian attacks and Mexican frontier skirmishes had been successfully checked, 450 Rangers were officially reorganized as peace officers. Their efficiency earned for them the fear of all criminals, and during the next three decades they continued to maintain the tradition that a Texas Ranger can "trail like an Indian, ride like a Mexican, shoot like a Tennessean, and fight like a devil." A century after its organization, this police force extraordinary had been reduced in number to only forty and was attached to the State Department of Public Safety.

Qualifications for membership in the Texas Rangers have always been courage of a high order, expert horsemanship, and an unerring aim. Close adherence to their traditions requires that every man be a gentleman, treating even the outlaw with a certain courtesy; and that he never turn back, but be ready instantly

to participate in detecting and apprehending criminal lawlessness in any form.

The Rangers furnish their own automobiles, horses, clothing, and weapons. The state, in addition to salaries, pays mileage for car operation, furnishes forage for horses, and food, ammunition, and medical care for the men. Though the men have no designated uniform, the usual outfit is a civilian suit, swaggering boots, and broad-brimmed hat. Carrying revolvers and automatic rifles, they still maintain their reputation for "quick drawing and straight shooting." They are also equipped with machine guns, tear-gas bombs, fingerprint outfits, and other modern means for fighting crime. Bowie knives were formerly carried in stout leather belts.

In the past the Texas Rangers have had to contend with many cunning, cruel outlaws, but their creed has been to "get their man." These outlaws included murderers; border smugglers; bank, train, and stagecoach robbers; mine bandits; and cattle and horse thieves. Outstanding in Ranger records was their success during 1917-1918 in routing the outlaws from the rocky Big Bend region. B.F.P.

TEXTILE, *teks' til*, a woven fabric, the name being derived from the Latin *textilis*, pertaining to weaving, and *textus*, a fabric. In general use, textile is an all-inclusive term for woven goods and articles made from them. These may be divided into a number of groups: cotton goods of all kinds; woolens, worsteds, and felt goods; silks and velvets; linens; fabrics of jute and other vegetable fibers; and those made from synthetic materials, like rayon, a

substitute for silk. The details of the processes by which all these varieties of textiles are made are given elsewhere.

Textile Industry. Most of these textile products have been manufactured for hundreds of years, but it is only since 1800 that the manufacture of textiles may be called a separate industry. Once it was customary for each household to produce most of the things it needed. The mother frequently spun the cotton or woolen yarn on her spinning wheel, wove it into cloth on a hand loom, and made the cloth into clothes. Later, in the household system, certain families and certain sections devoted their time to the making of cloth, all the work being done at home. These goods they sold at annual fairs, or to a middleman who traveled from house to house to make his purchases.

A further advance took place when a number of workmen assembled in a single building and worked for wages; this was the custom in English carding and fulling mills, long before the end of the eighteenth century. Between 1750 and 1800 came the inventions of Arkwright, Hargreaves, and others, destined to revolutionize the textile industry. This industry was the first to adopt the typical factory form of organization, which it has retained and developed to this day. It is a curious fact, however, that, in at least one branch of the textile industry, the household form has persisted, in spite of the growth of factories. In the manufacture of ready-made clothing, the sweatshop still exists, but is slowly disappearing. See INDUSTRIAL REVOLUTION.

Importance of the Industry. Textiles are made primarily for clothing, and have always been one of the leading classes of manufactures. In the United States, the value of the products of all the allied textile industries is exceeded only by that of foodstuffs; and in Great Britain and Ireland, the products of the textile industry are greater than those of any other group. In the United Kingdom, nearly 600,000 people are directly employed in the manufacture of textiles, and the number dependent, directly or indirectly, on the industry is seven or eight times as great. The textile industry of the United States employs nearly 2,000,000 people, chiefly in the five adjoining states of Pennsylvania, New Jersey, New York, Connecticut, and Massachusetts, and in North and South Carolina. The Canadian textile industry is growing rapidly, but still is small compared to that of the United States or Great Britain.

Textiles in the Schools. The study of textiles in schools is of a double character. The child, and particularly the girl, in the elementary and secondary schools, studies them chiefly from the viewpoint of the household arts or domestic economy. The technical

processes of textile manufacture, on the other hand, belong more especially to industrial education. As yet, the work in both branches has advanced little beyond the experimental stage. In many European countries, notably Great Britain and Ireland, Germany, Belgium, France, Norway, and Sweden, training in all household arts has for many years been a recognized feature of the school system. In the United States and Canada, the value of such training is being recognized everywhere, and courses are being instituted in many schools and colleges.

The study of textiles is a branch of social science—in other words, one of those subjects that are designed to make children better fitted for daily life. The study of primitive textiles involves some study of the beginnings of civilization, for the barbarian seldom knew how to weave. The textile arts are, then, to be considered in their relation to the broad questions of clothing and shelter, and such other practical points as modern methods of manufacture, varieties of textiles, their value for various purposes, and their prices. The adulteration of textiles is also an important point. The functions of textiles—that is, clothing—in health, beauty, and ethics is a phase of the subject too difficult for young children, but even in elementary schools, instruction in the care and repair of the wardrobe should be easily understood. Children in the higher grades, and in secondary schools, are capable of making many articles of clothing, and frequently of designing garments and household furnishings.

In the ordinary school course, textiles are studied from the standpoint of utility. To some extent, this viewpoint is preserved in technical education, but the emphasis is laid on methods of manufacture. In the United States, for example, there are a number of schools, supported partly by large textile manufacturers and partly by the state, which turn out each year hundreds of skilled workmen, familiar with the processes of manufacture and able to hold important positions in the mills. Noteworthy examples of such an institution are the Textile School at Philadelphia, and the schools at Fall River, New Bedford, and Lowell, three great cloth-making centers in Massachusetts. The Pratt Institute in Brooklyn (N. Y.) and the University of Chicago offer similar courses. In the South, textile courses are offered at the Agricultural and Mechanical College of Texas, the North Carolina State College of Agriculture and Engineering, Clemson Agricultural College, and Georgia School of Technology.

The more advanced work includes microscopic and chemical tests of the different fibers, dyeing and weaving, and pattern-designing, besides facts concerning the artistic and eco-

nomic aspects of the industry. Many schools also offer normal courses for teachers.

Related Subjects. Matter supplementary to this discussion of textiles may be found in these volumes, in the following articles:

Adulteration of	Crinoline	Poplin
Foodstuffs and	Damask	Rayon
Clothing	Dimity	Ribbon
Astrakhan	Felt	Satin
Broadcloth	Flannel	Shoddy
Calico	Flax	Silk
Cambric	Gauze	Taffeta
Canvas	Gingham	Tapestry
Chiffon	Hemp	Tartan
Cloth	Jute	Tweeds
Corduroy	Linen	Velvet
Cotton	Mohair	Weaving
Crape	Muslin	Wool
Cretonne	Plush	Worsted

THACKERAY, WILLIAM MAKEPEACE (1811-1863), one of the three most celebrated English novelists of the Victorian Age, the other two being Dickens and George Eliot. Thackeray was born July 18, 1811, in Calcutta, where his father was in the employ of the East India Company. He was sent, while still very young, to England to be educated. He spent several years at Charterhouse School, London, which he afterward described in *The Newcomes*, and passed a year at Cambridge, where Tennyson was a student at the same time. His well-known humorous verses on *Timbuctoo* were written on the topic assigned for the year's prize poem, but were not intended as a burlesque of Tennyson's poem, which won the prize. An interval of travel on the Continent followed, and then he settled down for a short time to study law.

From Art to Literature. In 1832 Thackeray came into possession of a considerable fortune, which was soon lost by the failure of an Indian bank and by unfortunate investments. From his boyhood days he had been fond of drawing, like his own Clive in *The Newcomes*, and he went to Paris to study art; but he was soon convinced that he would never be successful enough at it to earn his living, which he now found himself obliged to do. He began, therefore, in 1837, to write humorous tales and sketches, which were contributed, at first, to *Fraser's Magazine*, and to *Punch* from its establishment, in 1845, until 1851. Among the

collections of these writings are *The Yellow-plush Papers*, *The Irish Sketch-Book*, *Jeames's Diary*, and the *Snob Papers*.

Literary Development and Maturity. In 1836 Thackeray married Miss Isabella Shawe, who bore him three daughters, of whom one died in infancy. In 1840, however, Mrs. Thackeray's mind failed, and her husband was finally forced to abandon hope of her recovery, though she did not die until 1892. Meanwhile, his work had been growing in popularity, and with the appearance, in 1846-1848, of the serially published *Vanity Fair*, he became famous. In this novel, his intense hatred of sham and pretense is expressed in a satirical and wonderfully realistic picture of the life of the English upper class—a picture in which sordid desire for rank and wealth, and snobbish deference to the possessors of these prizes, are held up to ridicule and rebuke.

Not only casual readers, but also those who should see more deeply, have often called Thackeray cynical, but that he never was—he was too clear-sighted and too kindly. Indeed, his very ridicule of insincerity and vain show is praise for the opposite virtues. *Vanity Fair* was followed by *Pendennis*, which is in a measure autobiographical; *Henry Esmond*, a most faithful representation of English life in the early eighteenth century, by many reckoned his masterpiece and by some the greatest English historic novel; and *The Newcomes*, which by its pathos proves once and for all that Thackeray was no cynic. Colonel Newcome is one of the finest characters in all fiction.

In the year that *Henry Esmond* was published (1852), Thackeray gave further evidence of his keen insight into eighteenth-century life in his lectures on *The English Humorists of the Eighteenth Century*, delivered in the United States. In 1855 he made a second tour, lecturing on *The Four Georges*. These two series of lectures were published later, and are among the most delightful essays of the age. From 1859 to 1862, he was editor of the *Cornhill Magazine*, in which appeared his *Lovel the Widower*, *The Adventures of Philip*, *The Roundabout Papers* (a series of charming essays), and the first part of *Denis Duval*, which was left unfinished at the author's death. *The Virginians*, a sequel to *Henry Esmond*, published in 1857, is his only other really important novel.

His Place in Literature. It is the natural thing to compare Dickens and Thackeray, the two great humorous novelists of their age. Thackeray was a year older, but Dickens was the first to become popular, largely because of his energy and his self-confidence. Thackeray, on the other hand, was shy and sensitive all his life, and had always to drive himself to his work. The two were friends, without thought of jealousy; and by their pictures of English life, high and low, did an infinite service in making the England of their days live in the future.



Photo: Brown Bros.

WILLIAM MAKEPEACE
THACKERAY

Of himself he said, "I have no brains above my eyes; I describe what I see." He gave the world a true picture of the society of his day.

Thackeray's style is remarkable for its ease and simplicity. As he says himself, he likes "occasionally to step down from the platform and talk about" his characters, and this familiar, colloquial manner is one of the chief charms of his writings.

THAILAND, official name of Siam (which see).

THALER, *tah' lur*, a large silver coin current in North Germany from the sixteenth century until 1871, when the mark was first introduced. A few of these coins are still in circulation. The thaler was first coined in 1519, in the Bohemian town of Joachimsthal, from which it was then called *Joachimsthaler*. See **MARK**.

THALES, *tha' leez* (640-546 B.C.), one of the Seven Sages of Ancient Greece and the founder of the earliest school of Greek philosophers, at Ionia in Asia Minor. He was a native of Miletus. He founded the geometry of lines, having learned the geometry of surfaces from the Egyptians, and was the first to apply that science to practical use in the measurement of the distance of ships at sea, the height of pyramids, etc. Much of his fame in his own day was the result of his accurate prediction of an eclipse of the sun, in 585 B.C. The philosophy of Thales was based on the theory that all things are composed of water, which, though false, was the origin of the later philosophies. See **PHILOSOPHY**; **SEVEN WISE MEN OF GREECE**.

THALIA, one of the three Graces, and one of the Muses. See **GRACES**, **THE THREE**; **MUSES**.

THALLI, *thal' i*. See **LICHENS**.

THALLIUM, *thal' ih um*, a metallic element resembling lead. It is one of the discoveries made by means of the spectroscope. In 1861 Sir William Crookes found in the spectrum a green line, which had never been identified. He named the new element thallium, from a Greek word meaning a *green twig*.

Thallium is found chiefly in crookesite, a mineral obtainable only in Sweden. There are traces of it in copper and iron pyrites, and from these it may be extracted by a somewhat involved process. All compounds of thallium are poisonous, the effects resembling those of lead poisoning. The chief uses of thallium are in connection with the making of optical glass, and in the manufacture of fireworks, to give a green color. The atomic weight of thallium is 204.3, and its symbol is *Tl*. See **CHEMISTRY** (**The Elements**).

THALLOPHYTES, *thal' o fites*. See **ALGAE**.

THAMES, *temz*, **RIVER**, England's most important, though not its largest, waterway. Roman writers mention the *Tamesis*, and the name is probably a Celtic word, meaning *broad river*. It rises in the Cotswold Hills in Gloucester, in South-Central England, and flows in a generally eastward trend for 209 miles, expanding below London into an estuary

which widens to eighteen miles at its entrance into the North Sea. On its banks, above London, are Eton, Maidenhead, Oxford, Henley, Windsor, Hampton Court, Richmond, Kew, and many other places of interest, while below London Bridge, Greenwich, Woolwich, and Gravesend are the principal towns. The Thames is navigable for barges to within eighteen miles of its source, and it has been deepened below London Bridge until its docks are readily accessible to the largest vessels. The docks occupy thirty-five miles of the river banks. Though the Thames is crowded at its mouth with the busy commerce of a great empire, the upper reaches of the river are noted for their quiet, sylvan beauty.

At London Bridge the Thames is 250 yards wide, at Gravesend 700 yards, and at the Nore, between Sheerness and Shoenbury, the estuary is $5\frac{1}{2}$ miles wide, increasing in width to the North Sea, eight miles below. From London Bridge to the sea at the Nore is $47\frac{3}{4}$ miles. The Victoria Embankment and the Albert Embankment, in London, below Westminster Bridge, on the left and right banks of the river, respectively, form broad roadways, protected by massive granite walls on the river side. See **LONDON**.

THAMES RIVER, BATTLE OF. See **WAR OF 1812**.

THANATOPSIS. See **AMERICAN LITERATURE** (National Period); **BRYANT, WILLIAM CULLEN**.

THANE, a title of Anglo-Saxon origin, meaning variously a servant, attendant, retainer, or official, but always with a military significance. In old England, there was a system of thanehood, quite similar to knighthood of later days; a freeman who was not of noble parentage might become a thane by acquiring a certain portion of land, by making three sea voyages, or by taking holy orders. He was then recognized as a member of the territorial nobility, and his sons inherited his thanehood.

The thane had a vote in the local and general Witenagemot (which see). A thane of ordinary standing was sometimes known as "lord of the manor," while a successful thane might hope to become an earl. The king's thane was a member of his bodyguard. He was therefore a personal attendant in war, and an important person, one who had many social privileges; he was, moreover, responsible only to the king for his deeds or behavior. On retiring from personal service to the king, he was given a grant of land. After the reign of Henry II, the thane disappeared from English history.

In Literature. The thane was an important figure in story and verse of olden time. Shakespeare causes Macbeth to say (*Macbeth*, Act 1, Scene 3), "I know I am Thane of Glamis"; the thaneship of Glamis was the ancient inheritance of the Macbeth family. Sir

Walter Scott, in his *Lay of the Last Minstrel*, makes the chief sec—

... in the thanedom once his own,
His ashes indistinguished lie.

THANET, OCTAVE. See FRENCH, ALICE.

THANKSGIVING DAY, in the United States and Canada, a day set apart annually for the giving of thanks to God for the blessings of the year. Originally, it was a harvest thanksgiving, and while the purpose has become less specific, the festival still takes place late in the autumn, after the crops have been gathered. Indeed, it is probably an outgrowth of the harvest-home celebrations of England. Such celebrations are of very ancient origin, being nearly universal among primitive peoples.

The First Thanksgiving in the New World. Plymouth Colony's first dreadful winter, during which almost half of the Pilgrim company died, had passed, and renewed hope had grown up with the summer. When the corn crop was gathered, in the fall of 1621, Governor Bradford decreed a day of thanksgiving. Great were the preparations—the

few women in the colony spent days boiling and baking and roasting; and even the children were busy turning the roasts on the spits before the open fires. As guests, there were more than four-score friendly Indians, who brought, as their share of the feast, wild turkeys and venison from the woods. The tables were set out of doors, and the company sat about them as one big family. This first Thanksgiving, however, was not merely a feast—there were prayers and sermons and songs of praise; and three days had gone by before the Indians returned to their forest and the colonists to their tasks.

Later History. From Plymouth the custom spread to the other colonies, until in time the governor of each issued an annual Thanks-

giving Day proclamation. During the Revolutionary War, eight special days of thanks were observed after signal victories or wonderful deliverances from danger, and President Washington issued a general proclamation for a day of thanks, in 1789. In the same year, the Protestant Episcopal Church in America announced the first Thursday in November as a regular annual day for giving thanks, "unless another day be appointed by the civil authorities." It was not until 1888, however, that the Roman Catholic Church formally recognized the day.

For many years, there was no uniformity. Some states had an annual thanksgiving, others did not, and no proclamation was issued by the President. One woman, Mrs. Sarah Josepha Hale, the editor of *Godey's Lady's Book*, took an intense interest in the subject, and for thirty years sent out pleas through the columns of her journal for a nationwide thanksgiving. Nor did she stop at this. She wrote letters to each of the Presidents; and finally, in 1863, her efforts were rewarded, for President Lincoln

THANKSGIVING

For all that God in mercy
sends:
For health and strength,
for home and friends,
For comfort in the time of
need,
For every kindly word and
deed,
For happy thoughts and
pleasant talk,
For guidance in our daily
walk,
For all these things
Give thanks.



For beauty in this world of ours,
For verdant grass and lovely flowers,
For song of birds, for hum of bees,
For the refreshing summer breeze,
For hill and plain, for streams and wood,
For the great ocean's mighty flood,
For all these things Give thanks

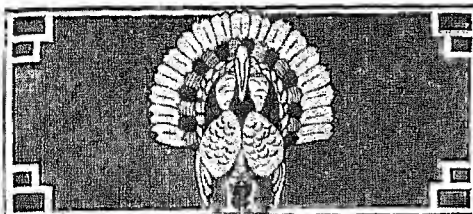


For the sweet sleep that comes with night,
For the returning morning's light,
For the bright sun which shines on high,
For stars that glitter in the sky—
For these and everything we see,
O Lord, our hearts we lift to thee,
And give thee hearty thanks.

... ELLEN ISABELLA TUPPER

appointed the last Thursday of November as Thanksgiving Day.

The same day was regularly set apart for seventy-five years. The President annually made a formal proclamation, and the governors of the various states called on the people to give thanks. In 1939, however, President Roosevelt designated the third Thursday in November, to allow a longer shopping period between Thanksgiving and Christmas. Because this arrangement proved impractical, Congress resolved that the fourth Thursday of November in each year, after the year 1941, be known as Thanksgiving Day. Looked upon with reverence, it is peculiarly a family day, and the very sound of the name brings back inev-



Suggested Program for Thanksgiving

The wee bird has its nest,
Safe in the tree so tall;
For birdlings' nest, for children's homes,
I thank the Lord for all.

Thanksgiving Hymn *Montgomery*

A Thanksgiving *Lucy Larcom*

Reading of the Thanksgiving

Proclamation

When the Frost Is on the Punkin. *Riley*

Essay, *The First Thanksgiving*

Thanksgiving Day . . . *Lydia M. Child*

Autumn Fires *Stevenson*

Essay, *The Pilgrims' Journey to America*

What the Wood Fire Said to the

Little Boy *Frank L. Stanton*

The Pumpkin

Whittier

Fable of the Ant and the Grasshopper

The Story of a Seed

Thanksgiving quotations

The Gift of Maize, from *Hiawatha's Fasting* *Longfellow*

Tableaux

Puritans going to church

The Puritan (Deacon Chapin)

Priscilla and John Alden

A Thanksgiving dinner in old New

England

The visit of an Indian chief

Landing on Plymouth Rock

Song, *We Thank Thee*



itable memories of "back home"; of the old farmhouse kitchen, and the pantry crowded with "good things."

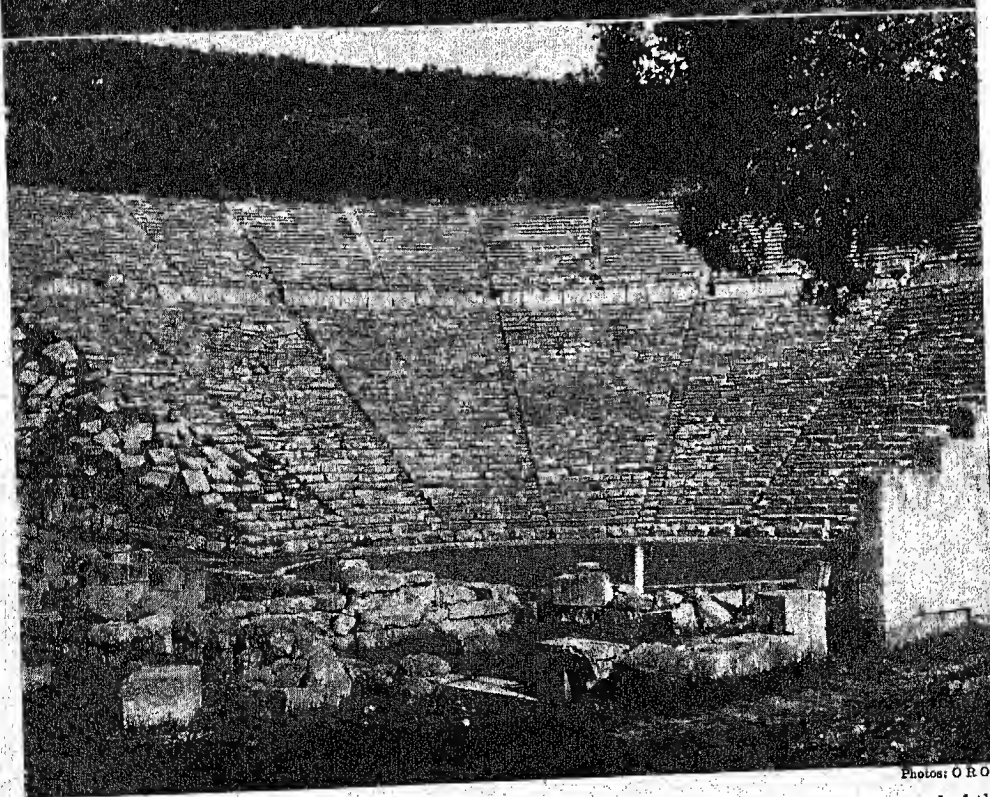
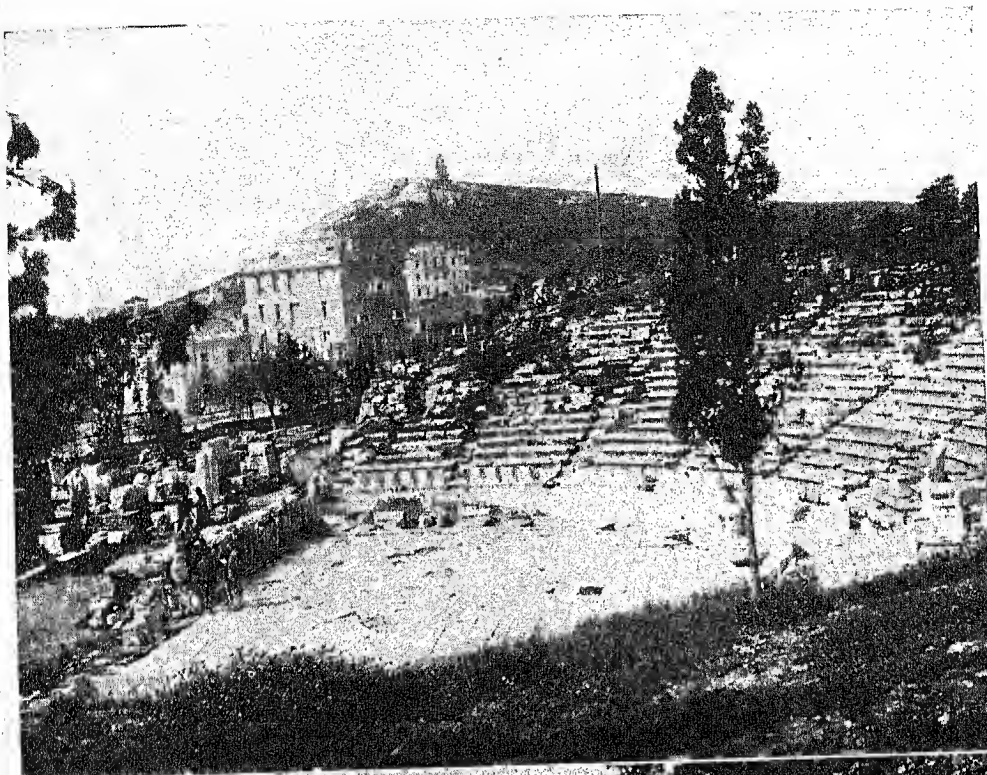
Thanksgiving Day in Canada. The Dominion, too, has an annual Thanksgiving Day, which is celebrated in much the same way, with family reunions and religious services. It is proclaimed by the Governor-General as a harvest festival, but although it is a public statutory holiday it is not traditional in date. Usually, it falls on the last Monday in October, but if harvest is especially early, an earlier day may be appointed. It is not strictly a legal holiday, being dependent solely on the government proclamation.

THAYENDANEGA, the Indian name of Joseph Brant (which sec).

THEATER, a playhouse, or a building in which dramas and other spectacles are presented to public view. The modern theater consists mainly of two parts, the auditorium and the stage. The auditorium is for the accommodation of spectators, and includes entrances and exits, stairs, offices, and rooms necessary to the conduct of the theater and the convenience of patrons. The auditorium is usually of horseshoe shape, with the floor sloping slightly upward from the stage. Balconies are built in most theaters, and follow the horseshoe shape of the auditorium. Immediately in front of the stage, a place is provided for the orchestra.

The stage itself is reserved for the actors and the scenery, which, to meet the demands of modern audiences, often is extremely elaborate. Behind and at the sides of the stage, and sometimes above it, are the dressing rooms for the performers. To handle the scenery and shift it into the changing positions demanded during performances requires the employment of a large number of men, including stage carpenters and scene-shifters. Above the stage are the "flies," where the scenery is hung in pieces, ready to be lowered into position on the stage; and below it is another space of sufficient depth to allow the scenery or properties from the stage to be lowered into it, when necessary. A complete system of electric lighting for the whole theater is now controlled by one or two men, operating at a complicated switchboard at the side of the stage.

The law, as a rule, requires theaters to follow certain rules in building arrangements, to furnish a specified number of plainly marked exits, and to be provided with efficient fire-fighting apparatus. To prevent the spread of fire from stage to auditorium, every theater must have a fireproof curtain, made usually of steel or asbestos, covering the stage opening, or proscenium, and this must be lowered at least once during every performance, to show that it is in working order.



Photos: O R O C

Theaters of Ancient Greece. Above, the Theater of Dionysus, at Athens. Below, the best-preserved of the Grecian theaters, at Epidauros. The orchestra, for the chorus, is the circular ground area, $39\frac{1}{2}$ feet in diameter. The highest row of seats is 193 feet from the orchestra, and 74 feet above it. The stage is in the foreground.

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Tasteful decoration, comfortable seats affording a good view of the stage from any part of the house, excellent acoustics, and proper ventilation, with air-cooling apparatus for summer days, are usually found in the best modern theater buildings. For standard dramatic performances, the tendency is to reduce the size of the auditorium and to eliminate the old-fashioned gallery. A single balcony, rising gradually to the top of the auditorium, is the modern substitute for the two or more balconies of the old-time theater. On the other hand, theater buildings intended for moving pictures are becoming larger, and, in the most important cities, constantly more magnificent. The best moving-picture houses of to-day surpass in seating accommodations and elaborateness anything the modern theater world has ever seen.

Ancient Theaters. The first theaters of Greece were rude affairs, built of scaffolding with raised seats, around a space in which the actors performed, or with the seats for spectators laid against a hillside. There was no curtain, but sometimes the stage was set off by low columns supporting an entablature; this pillared partition was called the *proskēnion*, from which the modern word *proscenium* is derived. As the drama developed, so did the theater. The collapse of a theater in 499 B.C. led to the building of more permanent structures, though it was not until many years later that stone buildings were erected. The theater of Dionysus, in Athens, remains of which are still to be seen, was a work of the fourth century, and was completed under the direction of the statesman Lycurgus. The ruins of theaters which are to be seen throughout Greece are all greatly similar in form to the first theaters of Athens. Some of these were vast structures capable of accommodating from 10,000 to 40,000 spectators.

The Roman theaters closely resembled the Greek. The building was in the form of a semicircle, not covered by any roof. While the Greek semicircle was often cut out of the side of a hill, with the seats arranged in tiers up the slope, the Roman theaters were usually built on the level. The part which would now be called the auditorium was called the *cavea*. The back of the stage, generally a blank wall supposed to represent any building before which the action of the drama took place, and concealing the dressing rooms or tents of the actors, was called by the Greeks the *skēnē*, evidently the origin of the present-day word *scenery*. The space between the stage and the audience was then, as now, called the orchestra, and was devoted to the chorus (see CHORUS) by the Greeks, but in Roman theaters was occupied exclusively by the Senators.

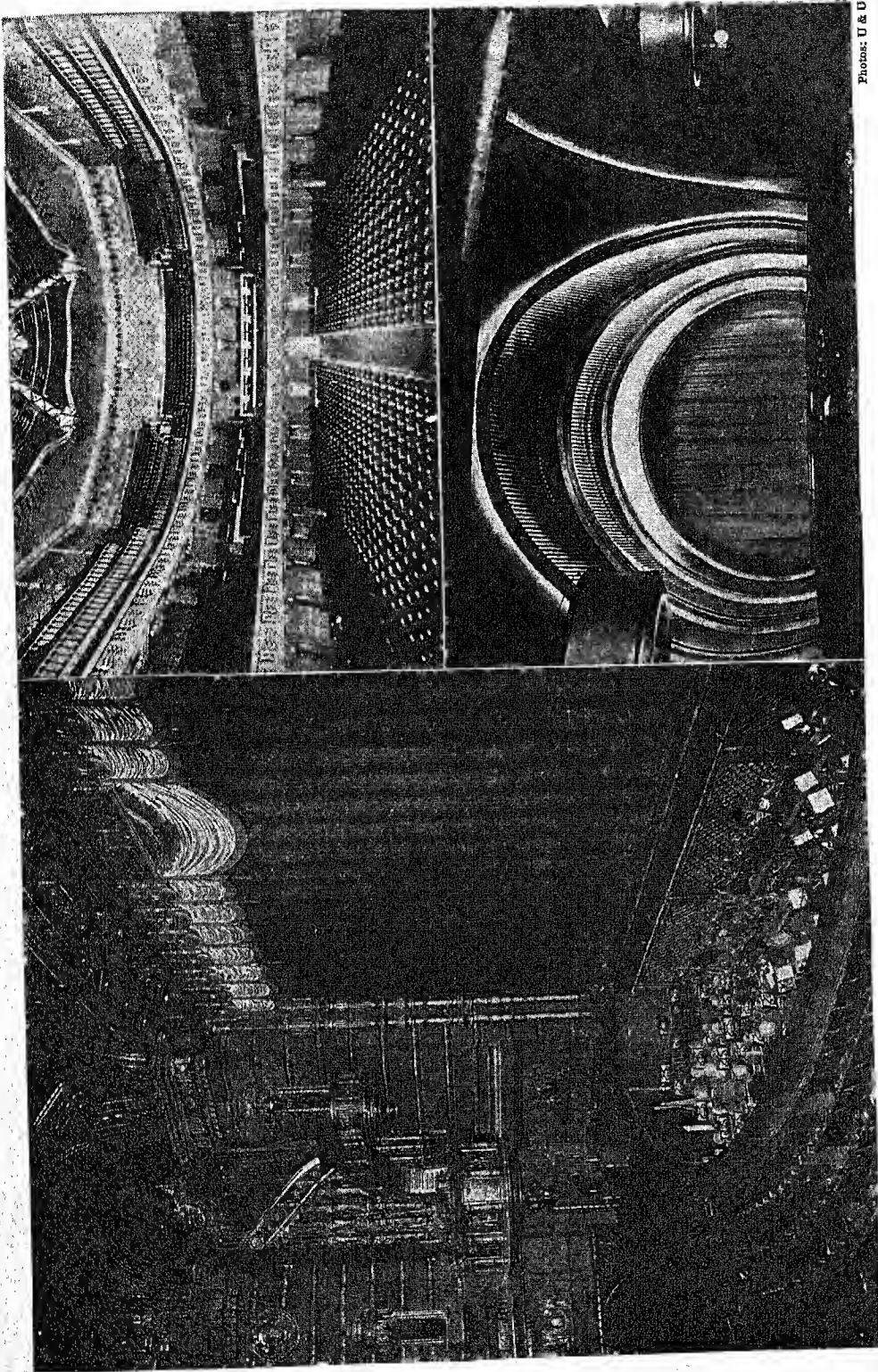
The immense size of the early theaters made it impossible for the actors to be heard by all

the audience. Metal mouthpieces, similar in principle to the megaphone, were sometimes worn. The actors were all males, the parts of women being taken by young men. It was not until 1622 that women appeared on the stage as actresses. See DRAMA.

The Theater in Shakespeare's Time. In the Elizabethan period of the drama, of which William Shakespeare, actor and playwright, was the bright particular star, there was a notable development in theater-building, as well as in the art of acting. This was due partly to the growth of a class of professional actors, who found the medieval type of play unworthy of their talents for the portrayal of character and of passion. The plays written for them therefore became more dramatic, and more interesting to the public. Companies of strolling players roamed the country, giving many of their performances in innyards. The English inn of that day was often a hollow square, with a central courtyard, surrounded by galleries; and there the strollers would hastily put up a platform, around which the country folk might stand, while the persons of quality could look down from the galleries. In London, the performances in places of public entertainment drew such crowds that the city authorities tried to suppress them; as a result, the players, formerly wanderers, were obliged to build theaters of their own, outside of the municipal limits, and to establish themselves permanently in such houses.

The first public theater thus established was built just outside of London in 1576, by James Burbadge, father of Richard Burbadge, an actor afterward associated with Shakespeare. The building was simply a hollow square, about eighty feet each way, open to the sky in the center, and consisting of little more than a quadrangle of galleries, which could be divided into private boxes for the accommodation of such persons as would pay for them. The whole ground floor was the yard or "pit," furnishing standing room for the mass of playgoers; and into this yard projected the stage, perhaps forty feet square. Where the rear gallery ran across the stage, a heavy tapestry curtain was hung, to shut off the space behind, which might be used as a dressing room. The rear gallery itself, just over the stage, was utilized as a balcony, a pulpit, the wall of a fortress, a roof, or any other elevation demanded by the action of the play. Certain favored spectators were allowed to sit on the stage, to the right and left, on stools, which might be hired. There was no curtain, and no scenery of any kind.

In 1598 the famous Globe Theater, in which Shakespeare produced many of his plays, was built by his friend Richard Burbadge, on the south bank of the Thames. In this building, also, there was no stage scenery, in the modern



Photos: U & U

The Modern Theater. At left, interior of the Roxy Theater, New York City; it is devoted to moving pictures and stage presentations. At right, above, interior of the Tusinsky Theater, Amsterdam, Holland, one of the largest in the world; below, interior of the Titanic Theater, Berlin, Germany, with striking ovals surrounding the stage.

sense of the word, but the costuming of the plays was elaborate, and properties, such as furniture and booths, were freely used. Two towns or two widely separated houses might be indicated on the stage at once, by the simple expedient of hanging descriptive placards on two separate doors at the rear of the stage, under the usual balcony. Performances were given only by daylight, but a little later, in the Blackfriars Theater, on the other side of the Thames—one of the first theaters to be roofed in—plays were given by candlelight. Seats were more freely provided in this theater, and its performances were attended by many of "the nobility and gentry"; but it was not until after the Restoration, in 1660, that the London theaters were generally roofed over and furnished seats for the occupants of the "pit," which is still the name used in England for the lowest floor of a theater, and for which popular prices still prevail. Prices of admission to the theaters of Shakespeare's time ranged from one penny to one shilling.

American Theaters. One of the earliest theatrical performances in America was that of Addison's *Cato*, for which the stage was set in a warehouse in Philadelphia, in 1749. In the following year, *Richard III* was performed in New York, with a makeshift stage and auditorium, and for several years stage plays were given in colonial warehouses and other rude structures. The first permanent theater in America was built in Philadelphia in 1766, of brick and wood. Oil lamps without chimneys "lighted" the stage, and there, on April 24, 1767, the first American play, *The Prince of Parthia*, was presented. New York's first theater was opened late in the same year, but it was not until after the Revolution, in 1794, that the first really complete theater in the United States was opened—the Chestnut Street Theater in Philadelphia. Almost every town in North America now has its permanent playhouse.

THEBES, an ancient Greek city in Boeotia, head of the confederacy known as the Boeotian League, and at one time the supreme power in Greece. Thebes lay in the southeastern part of the country, about forty miles north of Athens and midway between Mount Helicon and the channel separating Boeotia and the island of Euboea. According to tradition, it was founded by Cadmus, and there is a cycle of legends associated with the city that is almost as famous as the one connected with Troy.

The authentic record of Theban history begins with a controversy between Thebes and Plataea, toward the close of the sixth century B.C. In 431 B.C., a Theban force made an attack on Plataea by night, an event that precipitated the long-threatening Peloponnesian War. Under the tyrannical rule of Sparta, the Boeotian League fell to pieces,

but between 379 and 374 B.C. it was revived by the patriotic efforts of Pelopidas, and in 371 B.C. the Thebans under Epaminondas wrested Grecian supremacy from the Spartans by the victory of Leuctra.

Theban supremacy came to an end with the death of Epaminondas, in 362 B.C., and in the period that followed, the exhausted and disunited Greek states came under the rule of Philip of Macedon and his ambitious son, Alexander the Great. A revolt against Alexander was punished by the destruction of the city, but it was rebuilt in 315 B.C., and was revived under the later Roman Empire. Thebes again became prosperous during the eleventh and twelfth centuries, as a center of the silk trade, but it declined under the Turks. In 1311 it was destroyed by the Catalans, and the site is now occupied by Thivai, an unimportant country town with a population of about 4,000.

Related Subjects. The reader is referred in these volumes to the following articles:

Alexander the Great	Greece (History)
Boeotia	Pindar
Cadmus	Sparta
Epaminondas	

THEBES. See EGYPT (Ancient Cities).

THEFT, IN CHILDHOOD. See MENTAL CONFLICT.

THEINE, the' in. See CAFFEINE.

THEMISTOCLES, the mis' toh kleez (about 514-449 B.C.), an Athenian statesman and soldier, one of the chief figures in the stirring times of the Persian wars. Little is known of his early life, but after the Battle of Marathon and the withdrawal of the Persians, in 490 B.C., he became prominent as the rival of Aristides and the advocate of naval expansion for Athens. In 482 B.C., he succeeded in having Aristides unjustly banished, and he persuaded the Athenians to build ships and fortify their harbors, feeling certain that, in case of renewed invasion by the Persians, the conflict would be decided on the sea.

At the time of the Persian expedition in 480 B.C., he was the chief man in Athens, and one of the most powerful statesmen in Greece. With patriotic surrender of his right as commander of the fleet, however, he consented to serve under the nominal leadership of the Spartan Eurybiades, though it was really Themistocles who brought matters to an issue favorable to Greece in the great Battle of Salamis (480 B.C.).

He was then more powerful than before, and did Athens good service by holding the Spartans in diplomatic parleys until the walls of Athens were practically rebuilt, contrary to the express demands of the Spartans. His arrogance, however, alienated the affections of the people, who began to credit rumors that he was not above treason if the bribes offered were large enough, and some time before 471 B.C., he was ostracized. After remaining

for a time in Argos, he fled to the Persian court, and was assigned by the king of Persia a residence in Magnesia, where he lived in luxury until his death.

According to some accounts, Themistocles committed suicide by taking poison. Though there remain against him suspicions of treason, he undoubtedly was in his day the savior of Greece, and by his naval policy laid the foundations for the future predominance of Athens.

Related Subjects. The following articles in these volumes give valuable supplementary information:

Aristides	Ostracism
Greece (The Period of Glory)	Persian Wars
Marathon	Salamis
	Sparta

THENARDITE. See GLAUBER'S SALT.

THEOBROMINE. See ALKALOIDS.

THEOCRACY, a form of government in which God is accepted as the Supreme Power, and the laws are received as the commandments of the Invisible Ruler. In such a government, the members of the priesthood act as interpreters and expounders of the laws, and have authority in both civil and religious matters. The most notable theocracy was that of the Israelites, to whom the Law was given by God, through Moses, the Ten Commandments forming the basis of the covenant. The Puritan government of Massachusetts was also styled a theocracy, as it was for many years conducted on the principle of obedience to divine law.

Derivation. The word *theocracy* is derived from the Greek *theos*, meaning *God*, and *kratos*, which means *power*.

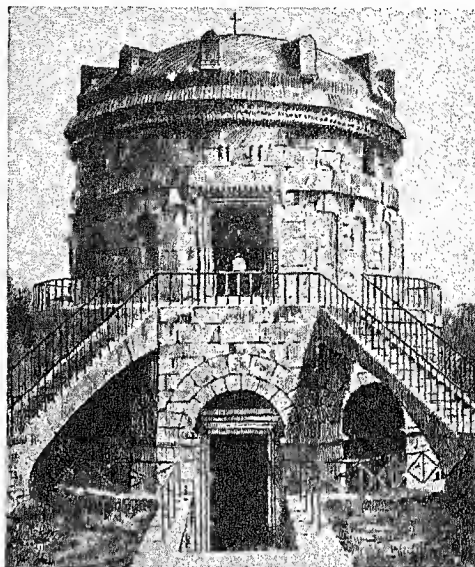
THEOCRITUS, *the ok' rih tus*, a Greek poet, regarded as the creator of pastoral, or bucolic, poetry. He was born either at Syracuse or at Cos. The dates of his birth and death are not known, but he seems to have done his best literary work between 285 and 275 B.C. He traveled widely, was on intimate terms with high officials of Egypt and Syracuse, and apparently led a life notable for honors and gifts. Thirty idylls, or pastoral poems, bear his name, but it is highly probable that several of these were written by other poets. This type of poetry, which he seems to have founded in Greek literature, consists of fresh, vivid descriptions of rural life, and is somewhat in the form of a simple drama, with groups of musical shepherds alternately responding. The influence of Theocritus is seen in Vergil and in such modern poets as Tennyson, Swinburne, and Austin Dobson.

THEODOLITE, *the od' o lite*, a surveying instrument for measuring angles. The movement of one circular plate, fixed to the telescope used in finding the object, is measured by verniers on another plate attached to the stand, in order to obtain horizontal angles.

Perpendicular angles are measured on a third circle in which the telescope is hung. The modern machine used by engineers and surveyors is equipped with transits and the instrument is properly called a theodolite-transit; in England shortened to theodolite, and in America, to transit. A moving picture camera combined with the instrument is called a recording theodolite. See SURVEYING; TRANSIT; VERNIER.

J.G.H.

THEODORIC, *the od' o rik* (about 454-526), king of the Ostrogoths, commonly known as **THEODORIC THE GREAT**. He was born in Pan-



TOMB OF THEODORIC

Erected about the year 530 by order of Theodoric's daughter. It may yet be seen at Ravenna, Italy, and is now known as the Church of Santa Maria della Rotonda.

nonia, where his father, Theudemir, was joint ruler with his two brothers over the East Goths. When but seven years of age, he was sent as a hostage to Constantinople, where he lived for about ten years. In 474 his father died; he became chief ruler, and at once began to threaten the Greek Empire and even Constantinople. He accomplished nothing, but the emperor constantly feared him, and in 488 allowed him to proceed against Odoacer, in Italy. For over four years the contest continued, but in 493 Ravenna, where Odoacer had taken refuge, surrendered, and Theodoric's conquest of Italy was complete. The victor killed Odoacer with his own hands, despite the terms of the peace, and took the title of king of Italy.

From that time on, Theodoric abandoned war almost entirely, and devoted himself to improving his country; and Italy enjoyed under him a period of unexampled prosperity and

peace. Taxes were lightened, agriculture was promoted, and the good will of the original inhabitants of the land sought in every possible way. Theodoric himself was a follower of Arianism, but he showed the broadest tolerance of Christians until near the close of his reign, when he retaliated for Emperor Justin's persecutions of the Arians by imprisoning Pope John and permitting the execution of several leading members of the Church, including Boetius and Symmachus. Remorse for this deed is believed to have hastened his death. See GOTHs (The Ostrogoths).

THEODOSIUS I, *the o doh' shih us* (about 346-395), a Roman emperor, known as **THE GREAT**. He was born in Spain and was the son of Theodosius, a great general who served the emperor Valentinian I. He accompanied his father in his campaigns in Britain, and himself defeated the Sarmatians in 374; but in 376, when his father was put to death, he retired from service and lived quietly in Spain. In 378 Emperor Gratianus summoned Theodosius to become his colleague on the throne, being aware of his own inability to govern the vast Roman Empire alone, and gave him the Eastern provinces, including Thrace, Dacia, Macedonia, and Egypt. The Goths were seriously menacing the empire, and it was the especial duty of Theodosius to repel these invasions—a perilous task, but one which he performed successfully, gaining victories by his diplomacy, as well as by generalship.

In 383 Gratianus met his death at the instigation of a usurper, Maximus, who for five years ruled the Western Empire as colleague of Theodosius; but in 388 the latter overthrew Maximus and became sole ruler. He recognized the young Valentinian II, son of Gratianus, as ruler of the West, and undertook a successful campaign to avenge his death at the hands of Arbogast. A revolt in Thessalonica in 390 roused Theodosius' wrath, and he took a cruel vengeance. The people of Thessalonica were invited to attend an exhibition in the circus, and when 7,000 or more of them had gathered, the doors were closed and they were massacred by barbarian soldiers. As a punishment for this inhumanity, Ambrose, bishop of Milan, refused Theodosius communion for eight months, and brought him to repentance and public penance. Theodosius was zealous for the Christian faith, and ordered the destruction of all heathen temples throughout his dominions, but history records him as cruel and vindictive in his persecutions.

THEOLOGY, the science of religion, which includes the study of the world with reference to a Supreme Being; also a critical study of doctrines, religious works, church history and institutions, the sacred languages, and the psychology of religious experience. See **RELIGION**.

THEOREM. See **GEOMETRY** (Terms Used).

THEOSOPHY, *the os' o fie*, a system of philosophic and religious thought, based on claims of a special insight into the divine nature and the fundamental laws of the universe. Jakob Boehme (1575-1624), a German mystic, who was one of the early theosophists, claimed that he was enabled by a direct divine illumination to see the root of all mysteries. His conclusion was that the world is simply a manifestation of God, created to exhibit, in the end, the eternal victory of good over evil, of love over wrath. Other thinkers along the same lines were Schelling, Molitor, and Swedenborg (which see).

In recent years, the term theosophy has been widely accepted to represent the beliefs and teachings of the Theosophical Society. This society was founded in the United States in 1875 by Madame Blavatsky (which see) and others. In 1907 Mrs. Annie Besant (1847-1933) succeeded to the presidency, but a separate organization had been previously formed in America after the death of Madame Blavatsky, in 1891. Hindu and Buddhist thought and doctrines have been prominent in recent theosophical teaching, a characteristic feature of which is the belief in reincarnation, in accordance with the Hindu doctrine of Karma—that the spirit advances to its goal through a succession of earthly lives, and that the consequences of a man's actions in his present life are reaped by his successor on earth in a fresh incarnation.

THERAPEUTICS, *thehr ah pu' tiks*, the science of healing disease. Medicines, operations, diets, and other measures used in treating diseases are therapeutic agents, and their use is an aid to normal body functions in restoring health. Therapeutics also includes preventative measures. When a particular kind of treatment is indicated, the suffix word *therapy* is generally used as a part of the name.

Preventative therapy is any form of therapeutics directed toward the prevention of disease. The use of serums in vaccination and the application of principles of sanitation and hygiene are preventative measures.

Psychotherapy, sometimes called mental or suggestive therapy, is the oldest form of treatment. It was in use long before doctors and medicines were known. Faith in God and belief in one's own ability to overcome ailments are examples. The use of suggestion alone, or with other forms of treatment, often aids a patient. Even superstitious beliefs in idols, gods, or charms, have proved effective in healing.

Chemotherapy is the treatment of internal diseases by use of chemicals which kill the germs causing the disease, but without harming the patient. Examples are the treatment of

malaria with quinine, and the use of sulphanilamide for combating streptococcal infections.

Surgicotherapy is the science of removing diseased tissues and organs from the body.

Mechanotherapy aids nature in the curing of disease by mechanical means, such as movements and exercises. This includes osteopathy (which see), gymnastics, and massage.

Occupational therapy is the treatment of mental or physical disorders by means of work or interesting pastimes. By giving the patient "something to do," he is made to think about his activities rather than about himself. In this way he is speeded along the road to recovery. See OCCUPATIONAL THERAPY.

Physiotherapy makes use of physical agents, such as heat, cold, water, climate, or light. It includes many forms of treatment, such as baths, ultra-violet rays, X-rays, or change of climate.

Dietetic therapy is treatment by control of the kind and quantity of food taken by the patient. Diabetes, gout, and obesity may be corrected or held in check by regulation of the diet under orders of a physician who treats each case individually.

Related Subjects. For a detailed discussion of the various phases of healing, see the articles listed at the close of those on MEDICINE AND DRUGS; DISEASE; HYGIENE; SULPHANILAMIDE; and SURGERY.

THERESA, *te re' sah*, OR TERESA, SAINT (1515-1582), was a Spanish nun, a patron saint of Spain. She was born at Avila, in Old Castile, and studied in an Augustinian convent, where she was so stirred by the tales of the ancient martyrs that she determined to seek martyrdom for herself. In 1533 she entered a Carmelite convent, and though she frequently deprecated the lack of severity and asceticism in the discipline of the Carmelite Order, she made for many years no special attempt to introduce reforms. The reading of Saint Augustine's *Confessions*, however, combined with the death of her father and certain supernatural visitations, or trances, to waken in her an intense spirituality and belief in asceticism; and she began to feel that it was her duty to restore the Carmelite Order to its original rigidity of rule. With a few followers, therefore, she withdrew in 1562 and set up a new convent, where her ideas might be put into force. Opposition to her plan was strong, but the Pope sanctioned it, and finally the general of the Order invited her to introduce her reforms into other convents. She opened many new houses in Castile, and even beyond its boundaries, accomplishing wonders by her unaided efforts.

For years after her death at Alva, in 1582, several cities contended for her body, and since the power of working miracles was supposed to inhere in her bones, these were carried to various places. She was canonized

by Pope Gregory XV in 1622. Despite the visions, which those hostile to her in her own day laid to possession by evil spirits, but which succeeding generations interpreted as special signs of the divine favor, she was a woman of the utmost wholesomeness of mind and of much practical wisdom. She wrote an autobiography and several mystic treatises, and left a large number of interesting letters, all of which were published in 1587. These have been translated from the Spanish into Italian, French, Latin, and English.

THERMAE, *thur' me*. See BATHS AND BATHING.

THERMAL SPRINGS, OR HOT SPRINGS, springs whose waters are warmer than the surrounding air. A thermal spring with water at the boiling point, which spouts into the air at varying intervals, is called a *geyser*. There are also quiet springs which have boiling waters. At the other extreme is the pool at a high altitude, whose water is of a higher temperature than that of the surrounding region, but only a few degrees above freezing. It is in volcanic regions that springs having the highest temperature are found, and in such cases the water is heated by flowing over beds of uncooled lava, or by coming in contact with hot rocks. Hot springs in non-volcanic regions are probably caused by the circulation of water, at great depths in the earth, before it returns to the surface under pressure. Many mineral springs are hot springs. R.H.W.

Related Subjects. The reader is referred in these volumes to the following articles:

Geyser	Mineral Waters	Spring
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THERMAL UNIT. See UNIT, subhead; CALORIE.

THERMITE (trade name, *Thermit*), a mixture of powdered aluminum and iron oxide, which when ignited reacts to produce a superheated molten steel at about 5,000° F, used for welding iron and steel. In the rapid reaction which occurs, the iron of the iron oxide is liberated to the free state, and the oxygen combines with the aluminum. A similar reaction may be obtained by a mixture of powdered aluminum and other metallic oxides.

Thermite is used in two types of welds: (1) continuous joints in which new metal is added; and (2) pipe welding in which no new metal is added, the thermite acting as a heating agent. In either type the charge or mixture is placed in a crucible, set off by a magnesium wire fuse, and the reaction occurs. In the first type the crucible is placed over the joint to be welded, and the hot molten iron is drawn from the bottom of the crucible directly onto the joint. The fused aluminum oxide (or slag) rises to the top of the molten iron and protects it from oxidation. In pipe welding the crucible is tipped and the slag

runs off first, forming a crust around the parts to be welded. The hot metal following, melts the parts to be welded into each other.

In 1895 Dr. Hans Goldschmidt discovered a method for safely igniting the mixture and made thermite commercially feasible. It forms the core of certain incendiary bombs. See BOMB; WELDING; WORLD WAR II (Bombs). J.C.H.

THERMODON, an ancient river in Asia Minor. See AMAZONS.

THERMODYNAMICS, *thur mo di nam' iks*, the science of the motive power of heat, or the application of the principles of mechanics to heat phenomena. See HEAT; HEATING AND VENTILATION.

THERMOELECTRICITY, *thur mo e lek iris'-ih tik*, the electric current set up in a circuit of two or more unlike metals, or in a circuit of one metal, the different sections of which are in unlike physical states, when one of the points of contact is heated or cooled. As electrical energy may be transformed into heat and light, so heat and light may be changed into electrical energy. This may be shown by connecting an iron wire with a German-silver wire, and attaching the loose ends to a galvanometer. When the joined ends are heated or cooled, the needle will show a responsive movement. If bismuth and antimony be substituted for iron and German silver, the effect will be still more marked. Since their electromotive force is greater than that of any other two readily obtainable metals, antimony and bismuth are used in constructing the thermoelectric pile.

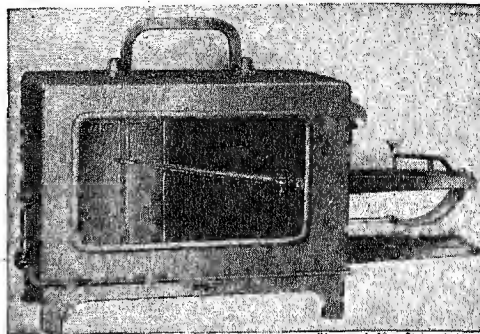
This pile, or battery, is constructed of alternate bars of antimony and bismuth soldered together, and is so sensitive to changes in temperature that it makes a very excellent substitute for a thermometer. As long as both faces have the same temperature, there is no current, but the slightest variation sets up a flow of electricity. This change may be almost infinitely small. There is, for example, enough heat in the body of a fly walking across one face of the pile to deflect the needle of the galvanometer. It is obvious that such an instrument is useful for detecting the most minute changes in temperature. This peculiar action of metals of different heat-conducting powers in starting electric currents was first observed by Johann T. Seebeck (1770-1831) in 1822.

H.S.E.

[See ELECTRICITY, and the various related subjects there named.]

THERMOGRAPH, *thur' mo graf*, an instrument which automatically makes a continuous record of temperature. A standard pattern, shown in the accompanying illustration, is provided with a "Bourdon tube," a curved tube with an oval cross section filled with liquid. Changes in temperature cause this liquid to straighten the tube or make it curve more

sharply. These movements are recorded by a pen arm which traces a corresponding graph on a revolving paper sheet moved by clockwork. Degrees of temperature are marked off on this sheet by vertical divisions, while hours of time



Photot Julien Friez & Sons

A THERMOGRAPH

are designated by horizontal distances. Usually, the paper is prepared to receive the record of one week, and, when the period is completed, the sheet is changed.

THERMOMETER, *thur mom' e tur*, an ingenious instrument for indicating temperature, one of the most useful applications of the law that bodies expand on heating and contract on cooling. There are various forms of thermometer, but the one in most common use consists of a glass tube, with a bulb of mercury or alcohol at the lower end. An increase in temperature causes the liquid to rise in the tube, and the point to which it rises is shown on a scale placed on or alongside the tube. As the substance in the tube has practically the same temperature as that of the surrounding air, the degree of temperature can be accurately read by noting the height to which the mercury or alcohol rises.

There are three standard scales—the Fahrenheit, Centigrade, and Reaumur—but only the first two are in general use. The Fahrenheit (abbreviated F.) scale has 180 divisions, extending between 212° and 32° above zero. These limits are, respectively, the boiling and freezing points of water. This scale is in general use for weather-temperature readings. The *clinical thermometer*, a modification of this, has a very short column of mercury, and is used by physicians in taking body temperatures. On the Centigrade (C.) scale, used generally in scientific calculations, the freezing point is marked 0°, and the boiling point 100°. The Reaumur scale, not now used, has 0° for the freezing point and 80° for the boiling. The pyrometer is designed to measure temperatures beyond thermometer range. See PYROMETRY.

Rules for Changing Scales. To change Centigrade readings into Fahrenheit, the number of degrees shown on the Centigrade scale must

be multiplied by $\frac{180}{100}$, or $\frac{9}{5}$, and the product increased by 32. Thus, 50° Centigrade = $(50 \times \frac{9}{5}) + 32 = 122^{\circ}$ Fahrenheit.

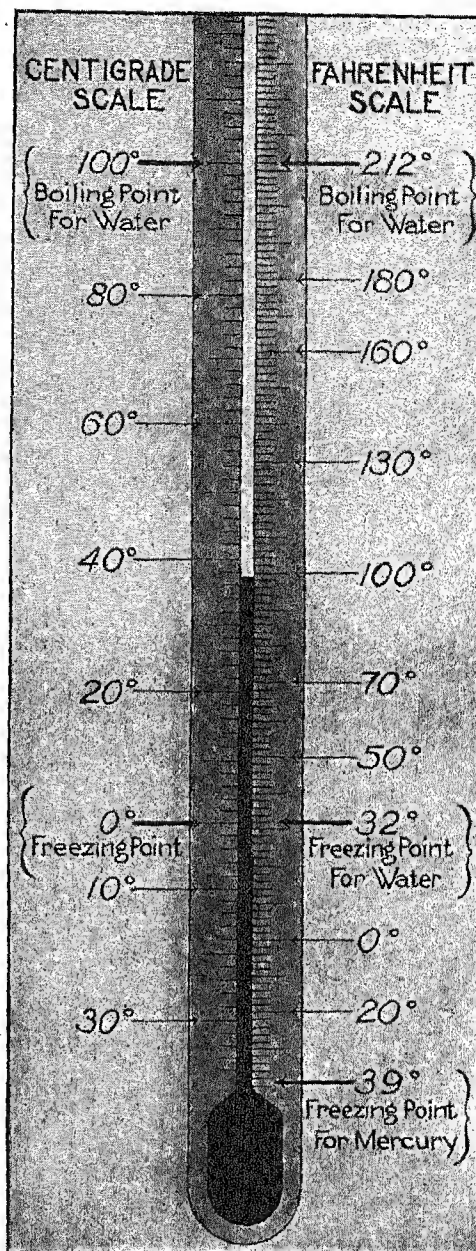
To change Fahrenheit readings into Centigrade, subtract 32 from the F. reading, and multiply the remainder by $\frac{100}{180}$, or $\frac{5}{9}$. Thus,

140° Fahrenheit = $(140 - 32) \times \frac{5}{9} = 60^{\circ}$ Centigrade.

How a Thermometer Is Made. The glass tubes used for thermometers are constructed so that expansion and contraction will be equal throughout the length, and before being accepted, they are thoroughly tested. When a tube is found to be satisfactory, a bulb is blown at one end of it, and the opposite end is worked into a funnel shape. A little mercury is inserted through the funnel mouth, while the bulb is gently heated to expel the air. When the bulb is full and sufficient liquid extends above it, the funnel end is closed. The closed tube is then immersed in melted ice, the point to which the liquid in the bore drops is observed, and a marking made, thereafter known as the freezing point of water (0° C. or 32° F.). The instrument is then immersed in the steam above boiling water. Another mark is made at 212° F. or 100° C. The intervening space between the freezing point and the boiling point is subdivided according to the scale desired, and the thermometer is ready for use.

Historical. The principle of the thermometer was known before the year 1600. It was Galileo, the great astronomer, who improvised the first instrument for measuring the range of temperature; this was an open-air thermoscope, which he displayed in 1593. It was provided with a bulb on the end of a long, slender tube, which was marked with a scale; when the device was lowered into water, some of the air was expelled from the bulb and the liquid rose in the tube. It could register with only approximate correctness, because the scale lacked accuracy.

The term *thermoscope* remained in vogue until about 1625, when it was succeeded by *thermometer*. The first thermometer with a more accurate scale was probably an alcohol thermometer, made in 1641 by Ferdinand, Grand Duke of Tuscany. Twenty years later, this scale was improved by Fabri, the two pivotal points registering snow temperature and average midsummer heat. Between 1664 and 1694, the freezing and the boiling points of water were proposed as the fixed temperatures, but it was not until 1709 that Gabriel Daniel Fahrenheit, with an alcohol thermometer, and in 1714, with one of mercury, introduced the scale with which we are now familiar.



THE THERMOMETER

Showing gradings for both Fahrenheit and Centigrade scales. Comparison of the two scales is thus made easy.

The Reaumur scale, taking its name from its inventor, was introduced in 1731; in 1742 Celsius and Christin devised the Centigrade scale.

A.L.F.

Related Subjects. The reader is referred in these volumes to the following articles:

Centigrade
FahrenheitGalileo
Heat (Expansion)Mercury
Temperature

THERMOPYLAE, *thur mop' ih le*, meaning, literally, *the hot gates*, is the name of a mountain pass of Greece. The mere mention of it is sufficient to stir in any hearer's mind thoughts of deeds of heroism, for it was here that Leonidas and his followers displayed their unexampled bravery. The pass, which leads from Thessaly into Locris, lies between Mount Oeta and the Maliac Gulf, and was anciently the only way by which an army might pass from Northern into Southern Greece. As it was a narrow track, about fifty feet wide, it was easily defended by a comparatively small force, and was thus one of the important strategic points in the country.

When, in August, 480 B.C., Xerxes with his vast hordes of Persians attempted the invasion of Greece, Leonidas, king of Sparta, went with 300 Spartans, 1,100 Thespians and Thebans, and allies from other Greek states, to the number of 3,500, to hold the pass of Thermopylae. For two days, the Persians tried in vain to force a way through, even the famous Immortals being turned back, but at evening of the second day, a treacherous Thessalian, Ephialtes by name, showed to Xerxes a path over the mountains, and the Persians were enabled to cross and fall upon the Greek rear. Dismissing, at the approach of the enemy, all his followers except the Spartans, Thespians, and Thebans, Leonidas prepared to fight to the death, and all fell except the Thebans, who surrendered.

Two hundred years later (279 B.C.), another invader, Brennus the Gaul, tried to enter Greece through the famous pass. He was held at bay there for several months, until a way was discovered over the mountains, but this time the Greek defenders managed to escape.

Some of the features of the ancient pass remain unchanged; the medicinal hot springs which gave it its name still bubble forth at the foot of the hill. The pass itself, however, no longer exists, for deposits of the river Sperchius have broadened it to a marshy plain, three miles wide at some places.

Related Subjects. In connection with this article, the reader may consult these topics:

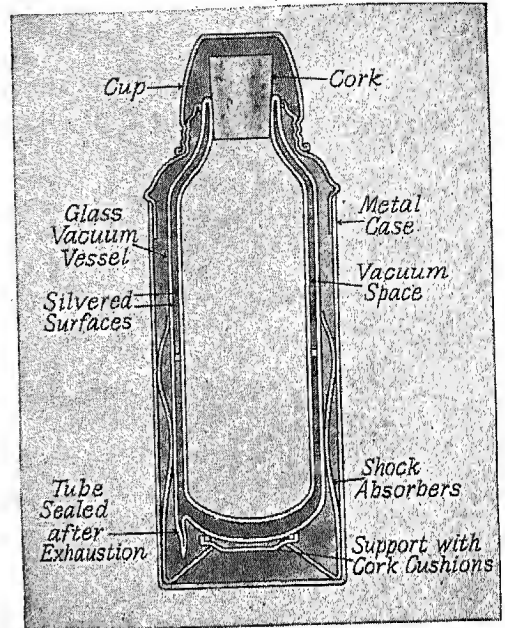
Greece (The Period of
Glory)
Leonidas
Persia

Persian Wars
Sparta
Xerxes

THERMOPYLAE OF AMERICA. See ALAMO.

THERMOS BOTTLE, a device for keeping substances either hot or cold. It is based on the principle that heat is transferred by the process of conduction, and that placing a non-conducting body next to a substance causes that substance to retain its heat or prevents outside heat from reaching it.

The thermos bottle consists usually of a double glass container enclosed in a metal case. The inner glass vessel is fused to the outer after the air between them has been exhausted, and the vacuum thus created acts as a non-conductor (see VACUUM). Hot liquids poured into the container keep hot, because heat cannot flow out across the vacuum; and cold liquids remain cold, because outside heat cannot reach them. Heat is also kept out or in by having the inside wall of the thermos bottle silvered.



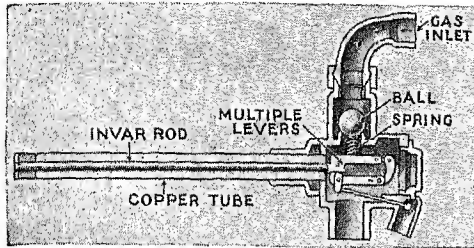
SECTIONAL VIEW OF THERMOS BOTTLE

This process creates a reflecting surface that turns back, or reflects, light rays that might convey heat out of or into the bottle. A cork closes the mouth of the bottle, and a screw cap seals the opening of the metal case. In the bottom of the case there is a spring or cushion upon which the container rests.

Theoretically, the contents of the bottle should remain hot or cold, as the case may be, indefinitely, but practically the limit of temperature stability is not more than twenty-four hours. Automobile tourists and picnickers find the thermos bottle a great convenience. Bottles of this type are manufactured under several trade-names, and in various sizes. One kind is made entirely of steel, which renders it unbreakable.

THERMOSTAT, an instrument used for the control of temperature. The source of the heat or cold is regulated automatically by the expansion and contraction of a temperature-sensitive material which is contained in the thermostat. Copper, mercury, or any

solid or fluid which has a high coefficient of expansion may be used. When a change of temperature causes the material to expand or contract, the resulting movement is used to start a mechanical device which in turn opens



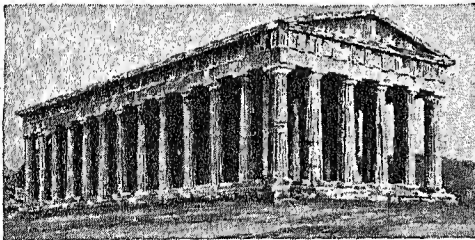
SIMPLE FORM OF THERMOSTAT

A popular design that is used on hot-water heaters. The invar rod (invar is an alloy scarcely susceptible to the influence of heat) is encased in a copper tube; the left extremity of the invar rod is anchored. The copper tube responds to falling temperature by contraction, which exerts a force on the invar rod. This gives action to the attached multiple levers, which increase the tension of the spring until it overcomes the weight of the ball, pushing it up and out of its seat, and permitting entrance of gas. The gas pours out of the burner holes, where a pilot light ignites it. [The burner is not shown here, as it has nothing to do with the action of the thermostat, which is shown complete.]

or closes a valve or moves levers, thereby regulating the heat- or cold-producing apparatus. See HEATING AND VENTILATION. J.G.H.

THERMOTICS, *thur mot' iks*, the study of heat. See PHYSICS; HEAT.

THESEUM, *the' se um*, among the Greeks, the name given to any temple erected in honor of Theseus (which see). A particularly cele-



THE THESEUM AT ATHENS

brated one which existed in Athens in ancient times contained what was supposed to be the body of Theseus, and was ornamented with paintings and sculptures showing his deeds. No trace of it remains, and its exact site is uncertain. There still exists, however, a famous and beautiful structure which is called the Theseum, though it was probably a temple to Hephaestus (Vulcan). This, it is true, bears sculptures showing scenes from the life of Theseus, but it has an equal number from the life of Hercules. This temple, the best preserved in Greece, is of Pentelic marble, in the

Doric style, and stands at the foot of the Acropolis. The interior to-day bears little resemblance to that of a typical Greek temple, for it was changed many centuries ago, when the building was used as a Christian church. For location, see ATHENS. R.N.

THESEUS, *the' se us*, a famous legendary king of Athens, whose marvelous exploits formed themes for Grecian poets, and whose wise and benevolent rule established the original power of Athens. He was the son of Aegeus and Aethra. It is recorded that Theseus tried to seize Helen of Troy for his bride, when she was but a child. He was brought up in seclusion by his mother, until he became a man. Then he removed the heavy stone which his father had placed over the sword and sandals by which he was to recognize his son, took his legacy, and proceeded to Athens, having many adventures on the way. Arrived there, he found his father much under the influence of his wife Medea, who, when she saw Theseus, recognized him as heir of the king and tried to poison him. Upon the failure of her attempt, she fled in her dragon car to Mcdia, never to return.

When Theseus learned of the terrible tribute Athens was compelled to pay to Minos, king of Crete, he volunteered to go as part of the sacrifice for that year, and, if possible, to kill the Minotaur, whose savage lust for human flesh had to be gratified. Aegeus pleaded in vain, and Theseus set out in a black-sailed vessel for Crete. He killed the Minotaur, with the aid of Ariadne, the king's daughter, and with her and his joyous companions set sail for Greece. As a punishment for his crime in deserting Ariadne, on the return home, Theseus was made to forget to change his vessel's sails from black to white, the agreed sign of the success of his expedition. In consequence, he suffered the loss of his father, who killed himself when, from the Acropolis at Athens, he sighted the black sail returning.

On his arrival at Athens, Theseus was proclaimed king, and entered at once on the beneficent policy which made the city great, and brought about the union of the various Attic communities into a single state. After years of prosperous rule, however, he became cruel and overbearing, and was driven by his people into exile on the island of Scyros, where he was killed. Too late they realized how great a man he had been; and they brought back his remains to the city and buried them in a beautiful temple, where the hero was worshiped as a god.

Related Subjects. The reader is referred in these volumes to the following articles:

Ariadne	Minos
Athens	Minotaur
Helen of Troy	Phaedra
Labyrinth	Theseum

THESPIA, a Greek poet who is generally considered the inventor, or father, of tragedy. He lived in Attica in the sixth century B.C. Thespis introduced in the old choruses an actor who replied to the leader of the chorus, thus laying a foundation for the spoken drama; and was himself both actor and manager, according to some authorities—transporting his properties on a cart from place to place, training local choruses, and giving public performances when they were ready. From Thespis, we derive the term *Thespian art* for the art of acting, and the name *Thespians* for actors in general. See **DRAMA**.

THESSALONIANS, *thes ah lo' nih anz*, **EPISTLES TO THE**, two New Testament epistles written by Paul from Corinth, early in the year 50 A.D., to the Church in Thessalonica, in Greece, which he had recently organized. The first was written for consolation and encouragement at a time when the Church was suffering persecution from the Jews; and the second to correct the disorder that resulted from an exaggerated belief in the early coming of Christ. They are the earliest letters of Paul extant, and may be regarded as the beginning of Christian literature. See **PAUL**.

THESSALY, a district in Northern Greece, in ancient times the largest of the historic divisions of that country. It was an extensive

from Epirus; the coast range of Ossa and Pelion, on the east, shut it off from the Aegean Sea. Mount Olympus, the fabled abode of the gods, rose on the northeast to a height of nearly 10,000 feet. The plain of Thessaly was drained by the Salambria River (the ancient Peneus), which found an outlet to the sea in the northeast through the beautiful Vale of Tempe, between Ossa and Olympus.

Among the various sections into which historic Thessaly was geographically divided, the region to the southeast, on the Pegasaeen Gulf (the modern Gulf of Volos), is of special interest, because of its association with ancient myth. From there Jason led the Argonauts in quest of the Golden Fleece, and it was the birthplace of the great Achilles. Near the modern Volos is the site of Iolcus, around which cluster many legendary tales.

The fertility of the soil of Thessaly was a powerful incentive to invasion by tribes from beyond the mountains, and during the period between the heroic and the historic eras, this desirable region became the object of various migrations.

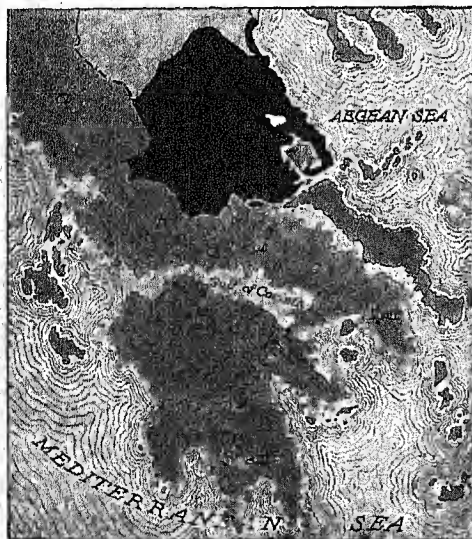
Only occasionally did the Thessalians enter actively into the affairs of Greece as a whole. In the fourth century B.C., however, united under Jason, the able tyrant of Pherae, they began seriously to threaten the rest of Greece, and were checked only by the assassination of their leader. Thessaly passed under the control of Macedonia in 352 B.C., through the conquest of Philip of Macedon, and was subject to that country until the Roman Flaminus, by the victory of Cynoscephalae, in 197 B.C., made Macedonia a dependency of Rome. Thessaly remained a Roman province until the fall of the Eastern Empire, after which it was dominated successively by the Venetians and the Turks. During the Greek war for liberation, which ended in 1827, the southern part was freed from Turkish rule, and the greater part of the region was united with Greece in 1881, through the intervention of the Great Powers.

At the present time, Thessaly comprises only the departments of Larissa and Trikkala. The great majority of the inhabitants are Greek. Volos, the one important port, maintains daily steamboat communication with Athens. A railroad connects Volos with Larissa, on the Salambria, and several other lines are distributed throughout the region. The plains of Thessaly favored the southward advance of German mechanized units in World War II. Part of Larissa was destroyed by earthquake in 1941.

Related Subjects. The reader is referred to:

Greece Jason Olympus Phillip II

THETIS, mother of Achilles, and connected with the incident of the "apple of discord." See **ERIS**; **TROY**; **MYTHOLOGY**; **ACHILLES**.



LOCATION MAP OF ANCIENT THESSALY
Historic Thessaly is the black area. (a) Epirus; (b) Aetolia; (c) Locris; (d) Phocis; (e) Boeotia.

plain, enclosed on all sides by mountains that formed an irregular square, each side of which was about sixty miles in extent. On the north was the Cambunian range; on the south, Mount Othrys; the majestic Pindus chain formed the western boundary and separated the country

THIERS, *tyair*, LOUIS ADOLPHE (1797-1877), a French statesman, historian, and President of the republic, who proved his ability and patriotism in one of the most trying periods in the history of his country, at the conclusion of the Franco-German War. He was born in Marseilles and educated for the law; but, finding a literary and journalistic career much more to his liking, in 1818 he went to Paris to write for the *Constitutionnel*. His liberal tendencies led him to undertake a *History of the French Revolution* in ten volumes, the last of which was published in 1827. This became extremely popular, despite the fact that, like all of Thiers' work, it was open to the charge of inaccuracy and unfairness. The *National*, a paper established by him in 1830 as an opposition organ, had much to do with the Revolution of 1830, which placed Louis Philippe on the throne.

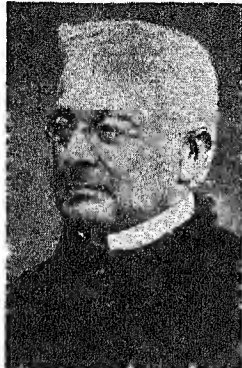


Photo: Brown Bros.

LOUIS ADOLPHE THIERS
The first President of the
third republic of France.

Under the new monarchy, Thiers became a member of the Chamber of Deputies, and between 1832 and 1836 held various offices in the Ministry, much of the time being virtually Prime Minister. He resigned in 1836 when Foreign Minister, but in 1840 again became President of the Council and Foreign Minister, only to be driven from office by the king's attitude toward his policy of favoring Mehemet Ali, in his conflict with Turkey. When the Revolution of 1848 broke out, Thiers supported it, and favored the establishment of a republic. Louis Napoleon suspected him, and had him banished in 1851, but permitted him to return the next year. During the next ten years, he worked on his *History of the Consulate and the Empire*. He reentered political life in 1863, as Deputy for a division of Paris.

His speeches in the Chamber of Deputies constantly called attention to the unenviable position of France among the nations, and so did much to bring on the Franco-German War; though he opposed that struggle, throughout it he labored zealously to gain aid for his country from the other European powers. With the defeat of France, his opportunity came. He was made "chief of the executive power" in the provisional government, and brought about peace with Germany. With great vigor, too, he put down the revolt of the Commune in Paris, and in August, 1871, for his services he was declared President of the

republic for three years. The indomitable spirit and will which had enabled Thiers to help his country in its extremity had made personal enemies, and by 1873 the opposition had become so pronounced that he resigned. From 1876 until his death, he was an influential member of the Chamber of Deputies.

Related Subjects. See, in this connection, FRANCO-GERMAN WAR; also FRANCE, subtitle *History*, relating to the period; GERMANY, subtitle *History*, descriptive of the period of the war of 1870-1871.

THIMONIER, BARTHÉLEMY. See SEWING MACHINE.

THIRD DEGREE, a method involving the infliction of pain, physical or mental, to extract confessions or statements about a crime. Its many forms include physical brutality and abuse, intimidation or threats, protracted questioning accompanied by the denial of food and sleep, refusal to allow access of counsel to the prisoner, and illegal detention.

In 1931, the Wickersham Commission made a report on *Lawlessness in Law Enforcement* in which they discussed the widespread use of the third degree in the United States. They declared the method to be a violation of fundamental Constitutional rights and therefore illegal. A further conclusion was that it "brutalizes the police, hardens the prisoner against society, and lowers the esteem in which the administration of justice is held by the public." Several states have laws which provide punishment for persons using third-degree methods. J.G.H.

THIRD-DEGREE MURDER. See MURDER.

THIRD ESTATE. See STATES-GENERAL.

THIRD INTERNATIONAL. See INTERNATIONAL, THE.

THIRD-RAIL SYSTEM. See ELECTRIC RAILWAY.

THIRD REPUBLIC. See FRANCE.

THIRST, that sensation by which the body announces its need of water. It is one of the *general*, or *internal*, sensations, as distinguished from the *special* or *exterior* (see SENSES, SPECIAL), and is thus in the same group as hunger, pain, and fatigue. The first sensations of thirst are referred to the mouth and throat, which feel dry. Moistening these parts without any actual ingestion of water will cause a disappearance of the sensation, while a local drying of these parts, even if the body itself be supplied with water, will produce the sensation. The pharynx, then, is considered an end-organ for the sensation of thirst, and it is here that the sensation is first recognized as satisfied. That the end-organ is sensitive to the general condition of the entire body is evidenced by the fact that the sensation of thirst may be appeased, in extreme need, by the injecting of fluids into the tissue or veins; also, in extreme loss of moisture, no amount of local moistening will cause thirst to disappear.

Water is absolutely essential to the maintenance of life. It forms almost three-fourths of the weight of the body, and is found in all its organs and tissues. While it is taken into the body every day through the process of eating, for practically all foods contain water, health is benefited by the copious drinking of this liquid. Authorities advise the person in normal health to drink six or eight glasses a day. If regular habits of drinking water are cultivated and persisted in, a healthy thirst can be created, and this should be the aim of every one. Such a thirst makes the individual a water-drinker in cold as well as in hot weather, when every one drinks freely to offset the loss occasioned by the increase of perspiration. The unnatural thirst that accompanies fever, diabetes, and various other diseases is caused by rapid reduction of the body fluids. K.A.E.

THIRTEEN ORIGINAL COLONIES. See UNITED STATES (Summary of History).

THIRTY-NINE ARTICLES, the statement of the religious belief of the members of the Church of England (which see). They are based on forty-two articles drawn up in 1551 by a commission. Edward VI died immediately after their publication, and Queen Mary would not acknowledge the Articles; but under Elizabeth, Archbishop Parker revised them, reducing them to thirty-nine. They were confirmed by the queen in 1563, and were ratified anew in 1604 and 1628. The Thirty-Nine Articles are accepted by the Episcopal Churches of Scotland, Ireland, and America, the latter having adopted them, with a few slight changes, in 1801.

In their origin, the Articles of Religion were devised as a compromise between the Roman and the Protestant (or later Puritan) views, and were intended to make it possible for both groups to remain loyally within the Church. They have accordingly always received widely varying interpretations, both in a Catholic and an Evangelical sense. Their language is drawn both from traditional Catholic theology and from the classic Lutheran statement of faith, the Augsburg Confession. See AUGSBURG CONFESSION. F.C.G.

THIRTY TYRANTS, a body of rulers representing the aristocratic party at Athens, appointed by the Spartans when they gained supremacy after the Peloponnesian War. They were given dictatorial power in all matters in the state, and under the brilliant but unscrupulous Critias, they plotted to establish their rule permanently, installing at Athens a Spartan military governor and garrison. They disarmed all the citizens except their own adherents, and put to death many wealthy members of the opposing party. In 403 B.C., after about a year of this reign of terror, the old democracy was restored. See PELOPONNESIAN WAR.

THIRTY YEARS' WAR, the last of the great religious wars of Europe. It was really a series of conflicts covering the period between 1618 and 1648. Though it began as a civil war in Germany, between the Protestant and Roman Catholic parties, most of the nations of Europe were drawn into it, one by one, and it ended as a general struggle for territory and political power.

Causes. The underlying cause of the war was the old, deep-seated hostility between the German Protestants and Roman Catholics, intensified by the different ways in which they interpreted the Treaty of Augsburg (1555), especially with reference to Church property. Both parties had violated the treaty at will.

The Outbreak in Bohemia (1618-1623). In 1608 the Protestants began to get ready for the inevitable clash by organizing the Evangelical Union. The Catholics retaliated with the Holy League. It needed only a special provocation on either side to bring matters to a head. That came when the Archbishop of Prague ordered the destruction of a church which the Protestants had begun to build. In anger, the people appealed to the king, Ferdinand II, but he was an ardent Catholic and ignored their protests. The majority of the populace were Protestants, and they took this as the signal for revolt. The event with which it began is known in history as the Defenestration of Prague. (*Defenestration* is from *fenestra*, the Latin word for window.) It was an old Bohemian custom for the people to punish offending officials by throwing them out of a window, and this treatment the mob applied to two of the king's ministers. This act precipitated the civil war that had so long been threatening.

At first, the Protestants met with success. They drove out the Jesuits and elected Frederick, the Palatine elector, as their king. But soon the fortunes of war began to favor the other side. Their own Evangelical Union held back its support out of jealousy, for Frederick belonged to the Calvinists, whereas the Union was strongly Lutheran. To make matters still worse for the popular cause, Ferdinand II—a member of the powerful Austrian House of Hapsburg—was made Holy Roman Emperor shortly after the revolt started, which naturally put new power into his hands. He was thus able to win an overwhelming victory at the Battle of the White Mountain, after which he sent his hosts throughout the length and breadth of Bohemia and the Rhine country, to pillage and destroy, until the insurrection was thoroughly stamped out. In the end, the Bohemian Protestants were deprived of the special religious privileges they had enjoyed, and Catholicism once more became the religion of the land.

The Danish Period (1625-1629). With things at such a pass in Bohemia, it was natural that the other Protestant states should begin to look to their own security, and consider the necessity of checking the ambitions of their zealous emperor. It was the king of Denmark, Christian IV, who took the first step. Enlisting the aid of one or two other states, and helped by a subsidy from England, he opposed Ferdinand's forces in Saxony. But the emperor had received unexpected assistance from Wallenstein, Duke of Friedland, who raised an immense army of adventurers and foreign mercenaries. This army he

placed at the emperor's service without expense, the understanding being that they were to take payment by plundering as they went. Such an arrangement naturally meant untold suffering for the German people, and brought about tragedies that are remembered even to-day, after three hundred years, in the tales the peasants tell their children. This army, and the forces of the Holy League under the great general Tilly, defeated the Danish king time after time, and he finally withdrew, after signing the Peace of Lübeck (1629). Even before that, the emperor had issued the Edict of Restitution, in accordance with which all Church possessions acquired by the Protestants after the Peace of Augsburg were returned to the Catholic side. Here was a source of further friction.

The Swedish Period (1630-1635). The "Lion of the North," Gustavus Adolphus, the great hero-king of Sweden, now entered the combat. He had two motives for interfering: his sincere devotion to Protestantism; and his ambition for Sweden, whose position on the Baltic would be endangered if the emperor succeeded in his plans. This was the first introduction of the political element. In 1630, therefore, Gustavus Adolphus sailed with 16,000 men—the best trained and best-disciplined army in all Europe. He tried to relieve the city of Magdeburg, under siege because of resisting the Edict of Restitution, but arrived too late to prevent its capture. The sacking of the city was so frightful a catastrophe that Tilly compared it to the fall of Troy and of Jerusalem. However, the Swedish army defeated Tilly's forces in the Battle of Breitenfeld (1631), and the following year in another conflict, in which Tilly was killed.

Emperor Ferdinand was now forced to recall Wallenstein, previously dismissed, and another nondescript army from all over Europe was gathered. It met the Swedish forces in the famous Battle of Lützen (1632), and Wallenstein's army was driven from the field. In a thick mist that covered the field with darkness, Gustavus Adolphus lost his way and somehow met his death; the spot where he fell is now marked by a splendid monument, which the Germans have erected in gratitude to the illustrious prince who saved the Protestant cause. The Swedes continued the struggle, with varying success, until 1634, when the model army of Gustavus was destroyed in the Battle of Nordlingen. At about this time, the emperor, seeing cause to suspect Wallenstein of treason, had him assassinated by his own lieutenants.

Swedish-French Period (1635-1648). The war now lost the religious character entirely, and became purely political. Richelieu, the real ruler of France at this time, was a Catholic, but he determined to interfere in behalf of the German Protestants, as a means of blocking the growth of Hapsburg power, for France and Austria had been enemies for hundreds of years. In fact, he had assisted Gustavus Adolphus with influence and supplies. In 1635 he adopted direct tactics and flung a French army into Germany. This force united with a new Swedish army, and, under the brilliant leadership of Turenne and Condé, as well as the Swedish generals Torstensson and Wrangel, a long series of victories was achieved, and the Protestants of Germany took fresh heart.

The Peace of Westphalia (1648). The people had long been crying for peace and relief from the misery this dreadful war brought

upon them. In 1645 the European powers sent representatives to a peace conference, the Catholic and Protestant delegates meeting separately in two different cities of Westphalia. Tedious negotiations continued, until finally, in 1648, the news that the Protestant armies were planning operations against Vienna brought certain concessions from the emperor. These made possible the agreement known as the Peace of Westphalia, which gave religious freedom to the German states.

Effects of the War. Pitiable indeed was the condition of Germany at the close of the war. More than half the population had been killed, and the survivors saw nothing but ruin wherever they looked. Whole cities, villages, and farms had disappeared; two-thirds of the tangible property had been destroyed. Wild animals that had been driven out as the country became civilized had returned to the wilderness which war recreated. Art, science, commerce, and industry were dead. There had been no time to educate the children. Thirty years of fighting had brought a lowering of moral standards, and attracted to Germany, as well as developed within Germany, vicious characters from whom the country suffered for several generations.

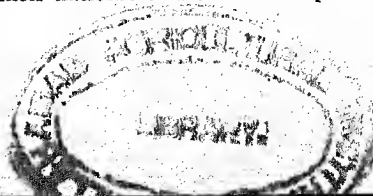
Related Subjects. In connection with this discussion of the Thirty Years' War, the following articles in these volumes may be consulted:

Augsburg Confession	Reformation, The
Germany (The Thirty	Richelieu, Cardinal
Years' War)	Tilly, Count of
Gustavus (II, Gustavus	Wallenstein
Adolphus)	Westphalia (Peace
Lützen, Battles of	of Westphalia)

THISBE, *this'* be. See PYRAMUS AND THISBE.

THISTLE, *this'el*, the name applied to a widely distributed group of plants bearing sharp spines or prickles. They are members of the composite family and are mostly weeds. Of the numerous species, the most troublesome is the so-called *Canada thisle*, described and illustrated in these volumes under that title. This is a European species that has become a pest in the United States and Canada. Thistle plants have tough, fibrous stems, much-divided, prickly leaves, and soft, silky flowers of various colors, usually borne in round heads that form large, downy seed balls after the blossoms wither. The seeds are scattered far and wide by the winds, and thistles therefore multiply rapidly. They also produce vigorous root-stocks, and the complete uprooting of a plant is often a difficult matter. Fragments left in the soil may cause the growth of new plants. The eradication of thistles from grain fields is thus a serious problem. Annual species must be cut down before the flowers bloom.

It is supposed that the plant adopted by the Scots as their national emblem is the species



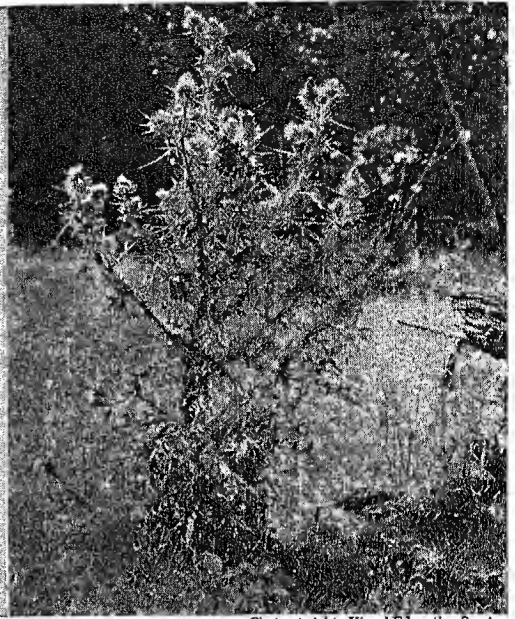
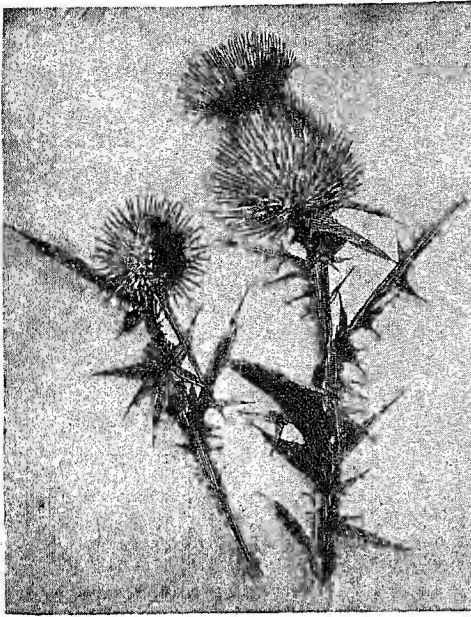


Photo at right: Visual Education Service

THE THISTLE BLOSSOM AND THE PLANT

known as *cotton thistle*, so called because it has a covering of white down. Various other species, however, have been given this honor. A number of plants similar to thistles are sometimes called by that name. Conspicuous among these is the *Russian thistle*, or *tumbleweed* (which see), a spiny-leaved plant of the goose-foot family that has caused farmers in Western United States much trouble.

B.M.D.

Scientific Names. The term thistle is strictly applied to the species of *Carduus*, *Cirsium*, or *Cnicus* of the family *Compositae*. The Canada thistle is *Cirsium arvense*; the Scots thistle, *Cirsium acaulis* or *Onopordon acanthium*; and the so-called Russian thistle, *Salsola tragus*.

THISTLE, ORDER OF THE, a royal order of Great Britain, conferred only upon peers of Scotland. A considerable antiquity is claimed for it, but, according to trustworthy records, it was founded in 1540 by James V of Scotland. It was dedicated to Saint Andrew, and bears the alternative title, Order of Saint Andrew. James II of Great Britain reorganized the Order in 1687, and Queen Anne revived it in 1703, when to the eight knights companions, who with the sovereign made up its original membership, four more were added. In 1827 the number of knights companions was fixed at sixteen, and no subsequent change has been made. The thistle is prominent on the badge and collar of the Order, which has as its appropriate motto *Nemo me impune lacessit* (No one injures me with impunity).

THISTLE-BIRD. See AMERICAN GOLD-FINCH.

THIVAI, the' veh. See THEBES (Greece).

THOMAS, AMBROISE, French composer. See OPERA (Some of the Famous Operas: Mignon).

THOMAS, AUGUSTUS (1857-1934), a foremost American dramatist, author of several plays that show his mastery of the technique of the drama. Notable among these are his *Alabama*, *Arizona*, and *In Mizzoura*, which also illustrate his fondness for using local color, and *The Witching Hour*, which deals with the power of hypnotism. Thomas was born in Saint Louis, Mo. Before he became a playwright, he had a varied career as page boy in Congress, law student, employee in a railroad freight house, newspaper writer, and editor and proprietor of the *Kansas City Mirror*. His first play, *Alabama*, was successfully produced in 1891, and thereafter he gave his whole time to dramatic work. In 1915, after the death of Charles Frohman, who was lost on the *Lusitania*, Thomas became art director of the Frohman theatrical enterprises. He was chosen executive chairman of the Producing Managers' Association in 1922.

Other Plays. Among his plays not mentioned above are *The Hoosier Doctor*, *The Man Upstairs*, *Oliver Goldsmith*, *The Earl of Pawtucket*, *Mrs. Leffingwell's Boots*, *The Education of Mr. Pipp*, *The Embassy Ball*, *The Harvest Moon*, *As a Man Thinks*, *Rio Grande*, *The Copperhead*, and *Palmy Days*.

THOMAS, GEORGE HENRY (1816-1870), an American military leader who gained the title "Rock of Chickamauga" for his steadfastness in one of the most desperate battles of the War of Secession. In that battle, his undin-

ing courage saved the Union army from total defeat.

Thomas was born in Southampton County, Va. After his graduation at West Point, in 1840, he fought against the Seminole Indians in Florida, and in the Mexican War, distinguishing himself repeatedly for gallantry in action. From 1851 to 1854, he served as instructor at the national Military Academy, and for five years commanded (as major) the Second Cavalry in Texas. When the War of Secession began, he remained loyal to the Union, though a Southerner by birth. It was in September, 1863, that he became a Union hero, through his gallant conduct at Chickamauga. Soon after, he was made commander of the army of the Cumberland, which was conspicuous in the great victory of Chattanooga. When, in December, 1864, he crushed Hood's army at the Battle of Nashville, Thomas was promoted to be major general in the regular army, and given a vote of thanks by Congress. After the war, he commanded military departments in Kentucky and Tennessee. In 1869, he took command of the Division of the Pacific, with headquarters in San Francisco, where he died. See WAR OF SECESSION.

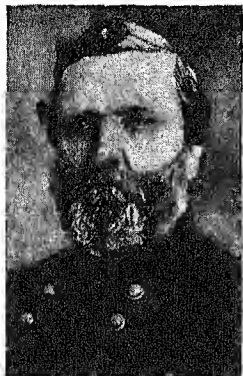


Photo: Brown Bros.

GEORGE H. THOMAS

THOMAS, JESSE B. See MISSOURI COMPROMISE.

THOMAS, NORMAN (1884-), American socialist, editor, and author, born in Marion, O. He was graduated from Princeton University in 1905 and from Union Theological Seminary in 1911. He served as minister of several Presbyterian churches in New York City until 1917, after which he followed literary pursuits. As the Socialist candidate for President of the United States, he ran in 1928, 1932, 1936, and 1940. Thomas is known as "one of the most-nominated men in American history." His writings include *Human Exploitation and War*—*No Profit, No Glory, No Need*.

THOMAS, SAINT. See APOSTLES.

THOMAS, SETH (1785-1859), American who built one of the largest clock factories in the world in Thomaston, Conn., in 1812.

THOMAS, THEODORE (1835-1905), an American musician and orchestra conductor, born at Esens, East Friedland, Germany. His musical training was received mainly from his father. He played the violin in public when only five years old, and at the age of ten began

to give public concerts. In 1845 he was brought by his parents to America, played with various New York orchestras for two years, and in 1850 accompanied Jenny Lind, as first violinist, on her first American tour.

In 1861 he began the formation of his own orchestra, and within three years had raised it to such a standard that he was invited by patrons of music in New York to give symphony concerts there. By 1869 the organization was known throughout the world, and was in constant demand for tours of the larger American cities. In 1872 he founded the Wagner Union. Thomas accepted the directorship of the Cincinnati College of Music in 1878, but failed to find there the scope of work he desired, and two years later he returned to New York. He became conductor of the Brooklyn Philharmonic Society, and once more showed his qualities as an inspiring leader.

In 1890 he went to Chicago, where, again, he established one of the world's greatest orchestras, now known as the Chicago Symphony Orchestra. For years there was annually a heavy deficit, but Chicago music patrons gladly paid the debts incurred. Thomas refused to present music of a low type, and he lived to see audiences able to appreciate his ideals. In 1904 a recital hall costing \$750,000 was erected in Chicago, but within a few months of its completion, overwork exhausted him, and he died early in the next year. In Grant Park, Chicago, opposite Orchestra Hall, is a monument to his memory. Frederick Stock (which see) succeeded him as conductor.

THOMAS À BECKET. See BECKET, THOMAS À.

THOMAS À KEMPIS (about 1380-1471), a medieval religious writer, author of *Imitation of Christ*, one of the most famous devotional books ever written. He was born at Kempen, in the Lower Rhine district, of a peasant family whose name was Hammerken. He acquired a good education in a famous school at Deventer, and about the year 1400 entered the Augustinian monastery of Mount Saint Agnes, near Zwolle. In 1413 he was ordained a priest, and thereafter lived in quiet at Mount Saint Agnes, becoming subprior in 1425. He was called Thomas from Kempen, after the fashion of the time in the schools; this became Thomas à Kempis, known to all the Christian world.

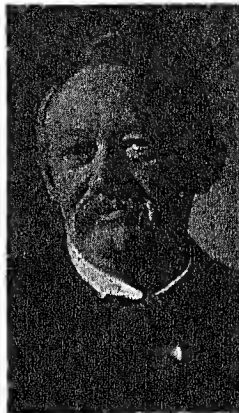


Photo: Brown Bros.

THEODORE THOMAS

Summary of His Work. He wrote *Meditations on Christ's Life*, *The Soul's Soliloquy*, and *Garden of Roses*, but these are practically unnoticed, because of the greater fame of his *Imitation of Christ*, which has passed through many hundred editions in all languages. There is still, it is true, some controversy about the authorship of this work, but it is almost universally accredited to Thomas à Kempis. A manuscript copy of it, in his own hand, exists, but this is not positive proof, as all monks were zealous copyists of good books.

This book, which has been more widely read than any other religious writing except the Bible, grew out of the author's monastic life, and aims to give counsel to all who are seeking the path to righteousness. Thomas à Kempis, whose piety seems to have been of the most genuine and humble character, finds the root of all good in love, the root of all evil in lack of it. People of distinction and power, in every age since, have been profoundly moved by the book; Luther, Samuel Johnson, George Eliot, and Lamartine have admitted their indebtedness. R.J.P.

THOMAS AQUINAS, SAINT. See AQUINAS, SAINT THOMAS.

THOMPSON, DAVID (1770-1857), a Canadian explorer and geographer born of Welsh parents in London. From a London charity school Thompson was apprenticed to the Hudson's Bay Company at the age of fourteen and immediately shipped to Hudson's Bay. He spent the years 1784 to 1812 in Northwestern Canada and the United States, making astronomical and land observations. Thompson made careful notes of each journey and wrote accurate descriptions of the natives, fauna and flora, and geographical features.

He surveyed the headwaters of the Mississippi River; he discovered a new route from the East to Athabaska Lake (which see); he first began trade with the large territory west of the Rocky Mountains; he was the first white man to explore the Columbia River from its source to its mouth. During his twenty-eight years of exploration he mapped 1,200,000 square miles of Canada and 500,000 square miles of the United States.

Retiring from the fur trade in 1812, he spent his remaining years in Ontario and Quebec. He worked from 1816 to 1826 on the eastern portion of the Canada-United States boundary survey.

THOMPSON, DENMAN (1833-1911), an American actor who endeared himself to a nation with the humorous character, Joshua Whitcomb, in *The Old Homestead*, created and acted by him for many years. He was born at Beechwood, Pa. At the age of seventeen he ran away with a circus, serving as an acrobat for a year. In 1853 he joined a theatrical stock company at Worcester, Mass. In 1875 he wrote *Josh Whitcomb*, a sketch showing the peculiarities of the old-fashioned New England farmer, and this was so successful that he rewrote it as a play. In 1887 he again enlarged and revised this comedy, which,

under the name of *The Old Homestead*, was enthusiastically received at its first performance in New York. Thompson also wrote *The Sunshine of Paradise Alley*, but he is remembered for the one vivid character of rural life that he gave to American drama.

THOMPSON, ERNEST SETON, the baptismal name of Ernest Thompson Seton (which see).

THOMPSON, FRANCIS (1859-1907), an English poet, the son of a Roman Catholic physician of Lancashire. Like Keats, he studied medicine, but abandoned that profession when his absorbing interest in writing led him to London. There, after five years of hardship and privation, his poems attracted the interest of Wilfrid and Alice Meynell, themselves writers of distinction and members of his own religious faith. With their help, he published, in 1893, a volume of poems which brought widespread and favorable attention to him. He later published *Sister Songs* (1895), *New Poems* (1897), and a prose treatise, *Health and Holiness*, on the ascetic life. Tuberculosis, caused by years of hardship, brought about his death.

The compelling beauty of vision and expression in Thompson's poems gives him a distinctive place among poets of his time; appreciation of him grows, rather than diminishes. The mystical poem, *The Hound of Heaven*, is his best-known work. R.J.P.

Other Prose Works. Besides the prose treatise mentioned above, Francis Thompson wrote *Life of Ignatius Loyola*, *Life of John Baptist de la Galle*, and an *Essay on Shelley*.

THOMPSON, JACOB, Secretary of the Interior under President Buchanan (which see).

THOMPSON, [JAMES] MAURICE (1844-1901), an American writer, best known as the author of *Alice of Old Vincennes*, a romantic novel of Revolutionary days. This entertaining and well-written story—his best literary achievement—was published the year before his death, and was the culmination of a group of writings that included poems, literary reviews, books on nature study, and a treatise on archery. Always a lover of outdoor sports, he was an enthusiast on the subject of the bow and arrow. Thompson was born in Fairfield, Ind., but spent most of his boyhood in Georgia and Kentucky, and while still a youth served in the Confederate army. After the war, he returned to his native state, settling in Crawfordsville. There he engaged in law practice and civil engineering, and at the same time began his career as a writer. He joined the staff of the *New York Independent* in 1890, and wrote a large number of its book reviews. His style was fresh and unconventional, and his books bore testimony to an enthusiastic love of nature and out-of-door life.

His Writings. Besides *Alice of Old Vincennes*, his books include *Hoosier Mosaics*, *The Witchery of Archery*, *Songs of Fair Weather*, *By-Ways and Bird Notes*, *The Boy's Book of Sport*, *Sylvan Secrets*, *The Story of Louisiana*, *The Ethics of Literary Art*, and *My Winter Garden*.

THOMPSON, SIR JOHN SPARROW DAVID (1844-1894), a Canadian jurist and statesman, Premier of the Dominion from 1892 until his death. Sir John became Premier at a time when the Conservative party was showing signs of disintegration. He planned many reforms, not merely for the party but for the Dominion, but he died before he could put many of these into effect.

Thompson was born at Halifax, N. S. There he studied law in a barrister's office, and was called to the bar in 1865. From the first he took an active interest in political affairs, and in 1877 was elected to the Nova Scotia assembly. A year later, he entered the provincial cabinet as attorney-general, and in 1882 became premier of Nova Scotia. He held office for only a few weeks, resigning to become chief justice of the provincial supreme court. In 1885, however, he again entered politics, accepted the place of Minister of Justice in the Macdonald Cabinet, and was elected to the Dominion House of Commons from Antigonish. In 1887 he was legal adviser to the British representatives who negotiated the Fisheries Treaty with the United States, and in 1893, while Premier, he was one of the arbitrators of the Bering Sea Controversy. Sir John died in Windsor Castle, where he had just taken the oath as a member of the Privy Council. Queen Victoria in 1887 conferred on him the honor of Knight Commander of the Order of Saint Michael and Saint George.

THOMSEN, C. J. See **ARCHAEOLOGY** (The Development of Archaeology).

THOMSON, CHARLES EDWARD POULETT. See **SYDENHAM, BARON**.

THOMSON, JAMES (1700-1748), a Scottish poet, born at Ednam, Roxburghshire. He was educated for the ministry at the University of Edinburgh, but abandoned his profession and went to London.

There he composed *The Seasons*, a series of poems in blank verse that became popular as soon as they appeared, between 1726 and 1730. In 1730 he started on a two years' tour of Europe as tutor to the son of Sir Charles

Talbot, afterward Lord Chancellor, who, upon his return, gave him an easy, but lucrative, government position. The income from this office ceased with Talbot's death, in 1737, but Thomson was granted a pension, and in 1744 was made surveyor-general of the Leeward Islands. In the meantime, he revised and enlarged each poem of *The Seasons*.

Other Works. *The Castle of Indolence*, Thomson's last work, is based on Spenser's *Faerie Queene*. Among his other writings are the tragedy *Tancred and Sigismunda* and, with Mallet, the masque of *Alfred*, containing the famous patriotic hymn *Rule Britannia*. Thomson's poems were the first to show the change from interest in mere form to a less restricted treatment of the beauties of nature.

THOMSON, WILLIAM. See **KELVIN, BARON**.

THOR, *thawr*, in Northern mythology, the god of thunder, eldest son of Odin. He was the strongest of the gods, and their champion in the almost incessant wars against the giants. As a child, Thor was noted for his size and great strength. Ordinarily, he was a good-natured boy, but sometimes he fell into such terrible passions that his mother was unable to control him, so she gave him into the charge of foster parents, who brought him up very wisely. When he had grown to maturity, he built in Asgard a wonderful palace which he named Bilskirnir (lightning). Thor was especially the god of peasants and the laboring classes. In the 540 halls of his great palace, he met his favorite dead, warriors who had fallen in battle, and feasted with them, as Odin did with their masters.

Thor's wife was Sif, whose chief attraction was her long, golden hair, which covered her from head to foot like a veil. One morning, Sif awoke and found her beautiful hair all gone. Thor, who admired it excessively, vowed that he would punish the thief most severely. He suspected Lok as the culprit, and, having followed him through numerous changing forms, at last captured him and compelled him to admit that he had taken Sif's golden hair. Thor, however, consented to let the traitor go if he would procure a new head of hair as beautiful as the first.

At once, Lok proceeded to the realm of the dwarfs, where he begged Dvalin to make the hair, and at the same time prepare presents for both Odin and Frey, whose anger he wished to disarm. For Odin, the dwarf made the famous spear which never failed in its aim, and for Frey the ship which sailed over land as well as water; and then he spun, from the finest gold thread, the long tresses which were warranted to grow luxuriously again, as soon as they touched the head of Sif. The skill with which this was done led to wagers being laid among the dwarfs, and, as a result of their competition, they made many other magic things which the gods afterward possessed. They



Photo: Brown Bros.

JAMES THOMSON

made for Odin the enormous boar with its golden bristles; for Frey, the magic ring of gold from which, every ninth night, eight similar rings dropped; and a magic hammer which came back to the hand that threw it. This last gift was for Thor. The hammer was always red hot, and even the handle was so heated that the god was obliged to wear an iron gauntlet, in order to use it. Besides this, Thor possessed a magic girdle which doubled his strength whenever he drew it around his body.

As Thor rode about the heavens in his brazen chariot drawn by two goats, from whose teeth and hoofs sparks were constantly flying, the lightnings flashed from his hammer, and as he threw it through the air, the thunder roared. Thursday is Thor's day. See ODIN; FREY; LOK.

In Art and Literature. In art, Thor is represented as a man in the prime of life, tall, well formed, with bristling red hair and beard, and strong, muscular limbs. Literature contains numerous references to the hammer of Thor.

THORACIC DUCT, *tho ras' ik dukt*, the main collecting trunk of the lymphatic system. It is the great trunk which receives the lymph from all of the body below the diaphragm, and from the left half of the body above the diaphragm. This duct, or canal, which is about the size of a goose quill and from fifteen to eighteen inches long, begins below at about the level of the second lumbar vertebra, in a dilated portion called the *receptaculum chyli*, or *receptacle of the chyle*, and extends up along the front of the column to the seventh vertebra of the neck; there it curves forward and downward, opening into the junction of the left jugular and left subclavian veins. Lymphatics from the right half of the body above the diaphragm open into the right subclavian vein. K.A.E.

Related Subjects. See color diagram under BLOOD. See, also, LACTEALS; LYMPH (The Lymphatic System).

THORAX, *tho' raks*. See CHEST; also ABDOMEN, for illustration.

THOREAU, *tho' ro*, or *tho ro'*, HENRY DAVID (1817-1862), an American naturalist and writer, was born at Concord, Mass., of Scottish and French descent. His father had been a merchant, but had taken up the manufacture of lead pencils, an occupation which Thoreau also followed at times. His love of nature was manifested early; when only twelve, he made

collections for scientific study. He was graduated from Harvard in 1837, and in the same year began his lifelong habit of keeping a journal. For several years he taught school at Concord and on Staten Island, N. Y., and delivered lyceum lectures in New England. Meantime, he took a boating trip with his brother on the Merrimack River, and his description of this outing, with his reflections by the way, later made up his first volume—*A Week on the Concord and Merrimack Rivers*. One thousand copies were printed, but only about two hundred were sold, and the rest were sent back to



THOR, GOD OF THUNDER

the author, who used to say thereafter, "I have now a library of nearly nine hundred volumes, over seven hundred of which I wrote myself."

A Life of Seclusion. In 1841-1843 and 1847-1848, Thoreau lived with Emerson; but part of the interval between, he spent in a hut on a pine slope at Walden Pond, near Concord, where he enjoyed a sort of hermit's life. He wished to prove his doctrine that a man could live naturally, earn what he needed, and have large leisure for study and culture. His home, which he built with his own hands, cost him twenty-eight dollars; he lived very frugally, supported himself by odd jobs of surveying and boat-building, visited among his neighbors, read widely in several languages, wrote for magazines, and kept a journal which he later revised and published under the title *Walden*,

or *Life in the Woods*. This book, probably his best work, shows few discoveries, but proves its author to have been a minute observer. His familiarity with the creatures of the woods was nothing short of remarkable; the birds came when he called, the animals showed no fear of him, and even the fish he could lift from the water with his hands.

Thoreau, who never married, spent most of his life, after leaving Walden, with his parents and sister at Concord, and in tramping trips in the Maine woods, about Cape Cod, and in Canada; and his later works are but repetitions with variations, of his earlier ones. His style is original and stimulating, and his writings, neglected for a time, are now taking higher and higher rank. He wrote some verse, which has the charm of force and originality, but which lacks warmth and melody.

Unusual Character. There has been much discussion as to Thoreau's character, his admirers holding that his independence and uprightness of spirit set him far above ordinary men; his detractors, on the other hand, declare that his difference from those about him was mere self-conscious eccentricity. It is true that he indulged in many vagaries. He refused to vote, to attend church, or to pay taxes, thus registering his protest against what he felt was an artificial life. He was not a hermit in the true sense of the word, however, for he had many valued friends, and visited freely among his neighbors. His bold public defense of John Brown, of anti-slavery fame, proved that he did have, at times, an interest in others besides himself.

His Writings. The two volumes mentioned above were the only works of Thoreau published in his lifetime, but several volumes, largely composed of material from his journal, were published after his death. They include *Excursions*, *The Maine Woods*, *Cape Cod*, *Early Spring in Massachusetts*, *Miscellanies*, and *Familiar Letters of Thoreau*. His fame rests largely on *Walden* and the *Excursions*.

THORIUM, a heavy metallic element, the dioxide of which, called *thoria*, is used in the manufacture of incandescent gas mantles, of which the United States consumes annually about 90,000,000. The element, which was discovered in 1828 by a Swedish chemist, is a gray powder which burns with a bright flame when heated in air; it occurs in monazite, orangite, thorite, and similar minerals. Tho-

rium has a wide distribution, though it occurs nowhere abundantly. Brazil, Norway, and North and South Carolina are important sources of supply. The monazite sands of North Carolina are exploited for the extraction of the oxide. Thorium is one of the radioactive elements (see RADIOACTIVITY). Its chemical symbol is *Th* [see CHEMISTRY (The Elements)]. T.B.J.

THORN, in botany, is a short, hard, sharp-pointed, and leafless branch, as of the hawthorn or the honey locust; it develops from a bud, like tree branches. The term is also applied to any thorn-bearing shrub or small tree, or its wood; especially, to the hawthorn and the blackthorn.

THORN APPLE. See STRAMONIUM.

THORNYCROFT, WILLIAM HAMO. See SCULPTURE (England).

THOROUGHWORT, *thur' o wurt*. See BONESET.

THORPE, ROSE HARTWICK. See CURFEW (A Poetic Theme); BELL.

THORWALDSEN, *tawr' wawld sen*, BERTEL (1770-1844), the foremost sculptor of Denmark, and one of the greatest of modern times. Like the great Italian Canova, he was the exponent of classicism [see SCULPTURE (Italy)], but he followed the Greek ideal more closely than his famous contemporary, and his works suggest, more than those of any other sculptor of his day, the serene beauty and purity of ancient Greek masterpieces. He was the son of an Iclander, a wood-carver. At the age of eleven, Thorwaldsen began his art studies in the academy of Copenhagen, his birthplace. When he was twenty-three, he won a gold medal and a scholarship which permitted him to study in Rome. Here his work received generous recognition from Canova, especially the plaster cast of a colossal *Jason with the Golden Fleece*. His first important commission (1803) was an order to reproduce this noble statue in marble, and, having once gained a reputation, he advanced rapidly in fame and fortune.

Among the famous works which he executed within the next few years were a frieze entitled the *Entry of Alexander the Great into Babylon* (in honor of Napoleon's expected visit to Rome), and the model for the *Lion of Lucerne*, a memorial to the Swiss Guards who died in heroic defense of the Tuileries, in Paris. This latter was copied by the Swiss sculptor Ahorn when he chiseled the sleeping lion out of the solid rock at Lucerne (see illustration accompanying the article SWITZERLAND). In 1819 Thorwaldsen returned to Copenhagen, and was greeted there with a reception that was a personal triumph. During a brief sojourn in the city, he received a commission to decorate the Church of Our Lady, and among the figures executed for this purpose is a colossal series of statues of Christ and the Twelve Apostles that



Photo: Brown Bros.

HENRY D. THOREAU

will always be regarded as among his masterpieces. These were not completed until 1838.

Returning to Rome, Thorwaldsen made for Saint Peter's a monument to Pope Pius VII, and executed many other important commissions. In 1825 he was elected president of the Accademia di San Luca, an honor not usually accorded to a Protestant. A subsequent return to Copenhagen, at the king's request, was made in a Danish frigate, and on the return journey to Rome, he made a triumphal progress. The last two years of his life were spent in his native city, and all his possessions were left to that municipality for the establishment of the Thorwaldsen Museum. In this institution are preserved the plaster models or originals of all of his sculptures, besides many other art treasures. His remains lie in the courtyard of the museum, buried under a bed of roses, by his special wish. His influence on contemporary and later artists was far-reaching, and he had a large share in bringing about the classic revival of the nineteenth century. Among his important works, besides those already mentioned, are *Cupid and Psyche*, *Memorial to Baroness Schubarth*, *Four Seasons*, and the medallions *Morning and Night*.

THOTH, *thoth*, or *toht*, an Egyptian god of wisdom who was the author of art, science, speech, and letters. He was represented with the head of an ibis or a dog, and with a tau cross in his hands. The records of judgment in the halls of Osiris were kept by him. He is identified with the Greek Hermes.

THOTHMES III, *thoth' meez*, or *toht' maez*, called **THE GREAT**, a king of ancient Egypt, under whom the country came to the zenith of its prosperity. Through a long series of conquests, including fourteen Asiatic campaigns, he subjugated Syria, Palestine, and part of Mesopotamia—almost all the territory, in fact, from the Nile to the Euphrates. On the walls of the great temple of Ammon, at Karnak, he had vainglorious accounts of his campaigns inscribed, erasing the names of earlier rulers to make room for his own. He built many temples, using in that way much of the wealth ravaged from his subject territories, and he erected the famous obelisks known as Cleopatra's Needles, one of which stands now in Central Park, New York, and another on the Thames Embankment, in London. The dates of his reign are uncertain, but it seems that he came to the throne about 1528 B.C., and died about 1475 B.C. His mummy, like those of Seti I and Rameses II, was discovered in 1881 at Deir-el-Bahri.



Photo: O R O C

THOTHMES III

Statue of the Egyptian conqueror, in the museum at Cairo.

THOUGHT, *thawt*. The mind is a storehouse furnished with bits of knowledge which are either innate or have been gathered by observation, reading, and reflection. Thought is the blending, or weaving together, of these bits of knowledge into new and abstract ideas. For example, we may perceive a particular object, such as the Mississippi River, and observe its color and current, or remember when it was discovered, but when we piece together the products of our observation and reading, and concentrate our attention upon some particular attribute of the river, such as its importance to commerce, or its relation to other rivers, we are said to *think*, or to arrive at our conclusion by processes of *thought*. The observation of an object is often unconscious and performed involuntarily, but thought, or the singling out of a particular attribute of the object, requires conscious effort. We think only when we have

some purpose, such as that of discovering likenesses and differences. Oliver Wendell Holmes says that "a thought is often original, though you have uttered it a thousand times. It has come to you over new routes by a new train of association."

The psychologist seeks to discover *how* we think. He divides the powers of the mind into *feeling*, *intellect*, and *will*, each of which is more or less represented in every mental act. Every thought is accompanied by a certain amount of feeling and is colored by it, while the will controls thought. The poet Lowell says:

All thought begins in feeling—wide
In the great mass, its base is hid,
And narrowing up to thought stands
glorified,

A moveless pyramid.

Similarly, there is thought in all emotion, and here again the controlling agency is the will.

Further, there are both thought and feeling in every act of will. The first step in the process of thought is *analysis*, or *abstraction*, which is the singling out of the characteristics and qualities of an object and the concentration of the mind upon one of these. The next step is known as *synthesis*, or the combining and relating of the qualities of a certain thing to those of other objects, and comparing them to determine their likenesses or differences.

This concentration of the mind always involves a muscular tension and an adjustment of the nerves and muscles, especially those controlling the movements of the eyes and head, and intense thought cannot be maintained for long periods at a time without physical exhaustion.

The logician is interested, not in the processes of thought, but in how to think *correctly*, and divides thought into three stages: first, the formation of a general idea, which he calls *conception*; then the combination of concepts to form a statement, or judgment; and, lastly, the passing from one judgment to another, or the process of reasoning and drawing a conclusion.

Method and concentration are required to produce clear thought. Writing and conversation constitute the harvesting of thought. Not only do they enable us to give our ideas definite form, but they suggest new ideas and open new channels of thought.

"Thoughts shut up want air
And spoil like bales unopened to the sun."

The influence of thought upon character is incalculable, for thought is the impelling force of every deed. "As a man's thoughts are, so is he" is a saying so old and well known as scarcely to need repeating. It is thought that distinguishes man from animal, and civilization from barbarism, and it is thought that has produced the moral, scientific, and economic development of the world. C.E.S.

Related Subjects. In connection with this article on thought, the reader is referred to the following articles in these volumes:

Apperception	Judgment
Association, Law of	Logic
Attention	Memory
Brain	Mind
Concept	Perception
Feeling	Psychology
Imagination	Reason
Interest	Will

THOUGHTFULNESS. See CHARACTER TRAINING (Thoughtfulness is Important).

THOUSAND AND ONE NIGHTS. See ARABIAN NIGHTS.

THOUSAND ISLANDS, THE. See SAINT LAWRENCE RIVER, subhead.

THOUSAND SPRINGS, THE. See IDAHO (Rivers).

THRACE, *thrays*, the ancient name of an extensive region in the Balkan Peninsula. Its boundaries varied at different periods of its history. It was situated to the north of Macedonia, and possessed rich agricultural lands and had also great mineral wealth. At one time the territory called Thrace extended from Macedonia to the Danube, and eastward as far as the Black Sea; while under the Romans, Thrace was the region south of the Balkans.

The Thracians were of Indo-European origin, akin to the Phrygians of Asia Minor. They were barbarians, warlike and fond of plunder, and were ruled by many petty kings. After having been made nominally dependent on Persia, the Thracians were subdued by Macedonia about 399 B.C. They regained their independence for a short time on the fall of Macedonia, but were conquered by the Romans, and Thracia became a Roman province in 133 B.C. Its

most important towns were Abdera, the birthplace of Democritus; Sestos, on the Hellespont, celebrated in the story of Hero and Leander; and Byzantium, on the peninsula now occupied by Constantinople. Greece is generally supposed to owe the foundation of its music, mythology, and philosophy to Thrace. With the fall of Constantinople, in 1453, the entire region fell under Turkish control.

In 1878, after the Russo-Turkish War, the northern part of Thrace was set off as Eastern Rumelia. The Conference of London, 1913, gave this territory to Bulgaria at the close of the Balkan Wars, but in 1923 the powers awarded Western Thrace to Greece and the remainder to Turkey.

THRASHING, OR THRESHING, MACHINE. This device ranks next in importance to the self-binder among agricultural machines, and since the middle of the nineteenth century, there has been about as much improvement in the one as in the other. The modern thrashing machine is built almost entirely of steel, and is equipped with ball or roller bearings on all the principal shafts. It really consists of a combination of four machines: the thrashing machine proper, which thrashes the kernels of grain from the straw; the separator, which separates the grain, together with considerable chaff, from the straw; the winnowing machine, or cleaning shoe, as it is commonly called, which cleans the grain; and the stacker, which discharges the thrashed straw from the machine up onto a stack. These units are all united into a single frame, which is mounted on wheels so that the machine can be moved from field to field.

The thrashing part of the machine consists of an iron cylinder called the *beater*, to which vertical teeth are attached in rows; and a *concave*, which is a section of a similar cylinder with the teeth on its inner surface. These are so adjusted that the teeth of the cylinder pass very close between the teeth of the concave, and, as the grain passes through between these teeth, the kernels are rubbed out. Just back of the cylinder and what is really an extension of the concave, is the grate, which consists of a series of parallel steel bars spaced about an inch apart, against which the thrashed straw and grain are forcefully thrown. Most of the grain falls through the slots between these steel bars to the grain conveyor below, while the straw passes over the grate on the straw rack, which has a vibratory or shaking motion that shakes out the remaining grain. The straw rack finally discharges the straw at its rear end into a fan, which blows it out onto the stack. In older types of thrashers, the straw was carried on up to the stack by means of an endless belt conveyor, called a *carrier*.

The grain conveyor carries the grain to the winnowing machinery, where the grain is sepa-

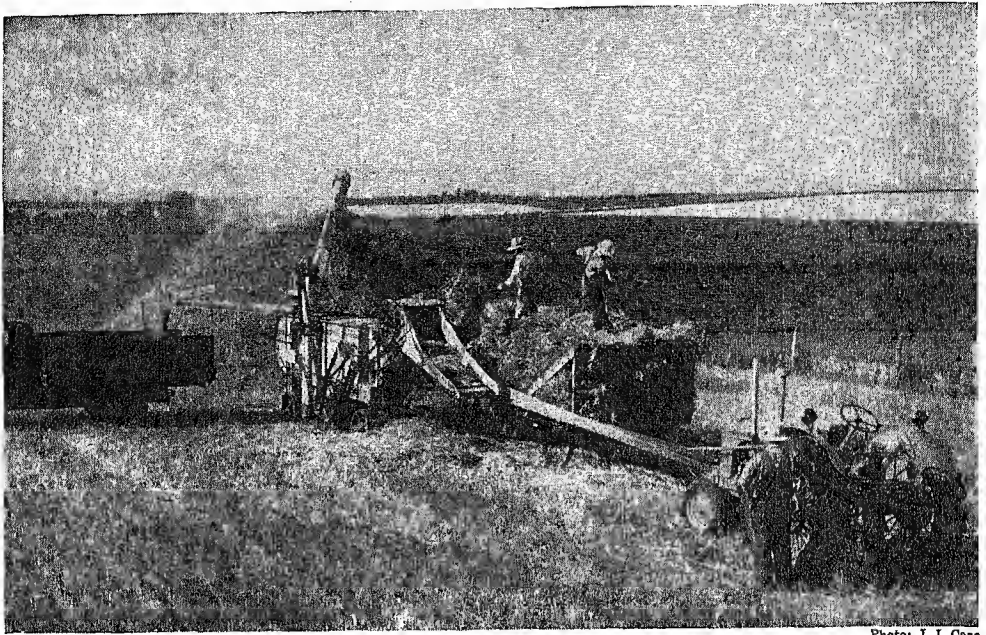


Photo: J. I. Case

A THRASHING MACHINE AT WORK.

rated from the chaff by means of a blast of air, and is then made to pass through a series of screens of different meshes, to remove the inferior kernels and the seeds of weeds. The cleaned grain falls into a cylindrical trough, and a revolving auger in this trough conveys the grain to the side of the machine, from which an elevator takes it to the weighing and measuring device. From this it may be placed in sacks, or loaded into wagons as it comes from the machine.

Most modern thrashing machines are now fitted with what is called a self-feeder. The bundles of grain are thrown onto a wide, endless belt that carries them up to a series of knives, which cut the twine bands. After the bands are cut, the bundles are spread out and fed to the cylinder by various types of mechanism. Formerly, the sheaves were pitched from a stack on each side of the machine to a band table. Two band cutters, one before each table, cut the twine band of the sheaf with a knife. The loosened sheaf was then fed into the cylinder by a man called the *feeder*.

Formerly, steam engines were employed to operate thrashers, and a type that burned straw was very common in the great wheat-growing regions, but these engines are being replaced by internal-combustion motors. The older machines were moved by horse power, but the *combine* is displacing most thrashing machines in the Far West (see REAPING MACHINE). F.W.D.

THREAD, a small twist of two or more strands of cotton, silk, flax, wool, or other fibrous substance, drawn out to some length and

used for sewing. Because of its cheapness, cotton is more extensively used in the manufacture of thread than either silk or flax, and the long-fiber, sea-island variety is the most valuable for the purpose. The supremacy of cotton in this field dates from 1794, when Samuel Slater began the manufacture of cotton thread in Pawtucket, R. I. The credit for the development of the idea which revolutionized thread manufacture belongs to the wife of Slater.

The thread-making process is somewhat complicated. In making cotton thread, after the fibers are cleaned, they are combed in carding machines until the tangles are smoothed out; then they are rolled over and over to form thick coils of soft yarn. These coils are then placed in the drawing frame, where they are passed between sets of powerful rollers; in these rollers, the cotton is drawn out and compressed into thin ribbons. These are fed to another machine, the doubling frame, where they are compressed into fine, delicate strips. Next, the strips are lapped, again drawn out, recarded to eliminate unevenness or other imperfections, and then wound upon bobbins. Several strands are twisted together and re-twisted into a coarse cotton yarn, and this is finally spun by several progressive operations into the finished thread. The latter is either bleached or dyed, and is then wound on wooden spools for marketing. See COTTON; SPINNING.

THRIFT. It has been said that "thrift is the wise use, without abuse, of human and material resources." The mere hoarding of money to no useful purpose constitutes miserliness just

as the hoarding of physical energy, without proper expenditure, is called laziness.

It is true that one form of thrift is the saving of money—that is, spending regularly less than we earn, or have. But in addition to its advantages as a character builder, the value of systematic economy lies in the proper use of the surplus (or capital) which it builds up. For instance, \$2,000 which Charles Lindbergh saved from the money which took him through his first flying school went toward the purchase price of *The Spirit of Saint Louis*, and Willa Cather saved enough from her salary as Associate Editor of *McClure's Magazine* to enable her to leave her desk and devote her time to writing such books as *My Antonia*, *Death Comes for the Archbishop*, and *Obscure Destinies*. Even more important is the saving of capital to protect oneself and one's family against the emergencies of life such as poverty and sickness. Almshouses are monuments to the failure of men and women to spend less than they earn.

The practice of economy, or thrift, is largely a matter of habit and, like most habits, can be more easily acquired in youth than later in life. The amount that is saved is not so important as that something of what one earns, or gets, should be saved regularly. Andrew Carnegie said, "The best way to accumulate money is to resolutely bank a fixed portion of your income, no matter how small the amount." Among Franklin's thrift maxims was: "For age and want save while you may, no morning sun lasts a whole day."

In addition to the facilities afforded by the Government for the systematic saving of money, there are several others such as savings banks, building and loan associations, and insurance companies. Although some of them have existed for upwards of a century, their early progress was pitifully slow. It became increasingly rapid after World War I except for a temporary check during the period of the 1930 depression. Total savings deposits at the end of the year 1932 were approximately four billion dollars less than at the end of the year 1931, with another decline of over three billion during the year 1933. The forward march was resumed, however, and at the end of 1939 total savings deposits in banks and trust companies in continental United States amounted to about \$25,081,000,000 with more than 45,420,000 individual depositors. As of December 31, 1939, the legal reserve life insurance companies in the United States had in force a total amount of insurance estimated at about \$114,000,000,000.

In spite of these imposing figures, it is a fact that very little was done on a national basis to promote systematic savings in the United States until about the time of World War I.

Government Stimulation of Thrift. Stimulation of thrift by the Federal Government on a national basis may be considered as dating

from the time of our entry into the World War in 1917. The immediate object of the Government was, of course, not primarily to promote thrift but to secure funds to assist in financing our war activities. An important result, however, was that a great many people began to save money regularly through subscriptions to Liberty Bonds and War Savings Stamps, on an easy payment basis.

The Postal Savings System was also started, offering facilities through the various post offices for the accumulation of savings by individual deposits which could be as small as \$1.00. During the year 1917 the System had approximately \$132,000,000 of deposits and by July, 1940, the principal represented by certificates of deposit amounted to \$1,293,409,000.

The activities of the Government in promoting thrift were further extended under the Franklin D. Roosevelt administrations. In the spring of 1935, the sale of United States Savings Bonds, known as "Baby Bonds," was inaugurated. These bonds could be bought in amounts of \$25.00 and matured after a period of ten years for a sum considerably larger than the purchase price, but they could be cashed in at any time after one year. At the end of the fiscal year 1935, the maturity value of bonds outstanding amounted to over \$83,400,000. As of June 30, 1940, the total maturity value of bonds outstanding was over \$4,165,000,000; approximately 75 per cent of these bonds were held by individual investors. In 1941, the Federal Government offered Defense Savings Bonds in connection with the financing of its national defense program. Small investors were encouraged to buy postal savings stamps, which were later exchanged for savings bonds.

There are other agencies of the Government which also stimulate thrift, although perhaps in a more indirect way. Among these are the Federal Savings and Loan Association, an agency of the Home Loan Bank Board established in 1933, and the Federal Social Security Act which became effective in 1935.

School Savings. In 1885 John H. Thiry, a native of Belgium familiar with the school saving system in Belgium and France, introduced a savings bank in one of the public schools in Long Island City. During the remainder of his life, Thiry was actively engaged in the promotion of this type of thrift effort. The growth of this idea was gradual, but at the end of seven years from the establishment of this first school savings bank, there were over 27,000 school children depositing small sums regularly through school banks in various cities, and the total of these deposits amounted to over \$200,000. During the year ending June 30, 1941, over 2,239,000 school children deposited \$12,772,000. Total deposits were \$34,417,000.

The first state to make thrift education compulsory in the public schools was Massa-

chusetts, which added the teaching of thrift to the school curriculum in 1910. In all, thirty-seven states now afford opportunity for school savings. The co-operation of various social and business organizations, especially that of the National Education Association, the Savings Division of the American Bankers Association, and the Parent-Teachers Association, has been exceedingly valuable in this work.

The systems of savings in force differ slightly in various schools, but the basic idea is the deposit by school children of small sums, at regular intervals, in a savings bank operated by the school and often under the immediate direction of students, or the collection of these savings at periodic intervals by individuals within the schools appointed for that purpose. The savings of the pupils, whether deposited in school savings banks or collected from them directly, are turned over at regular intervals to the local savings banks which maintain an account for each student and furnish the usual deposit book containing the record of the deposits and the interest earned on them.

It is surprising what a heavy role interest plays in the growth of savings accounts. Franklin said, "Remember that money is of a prolific generating nature. Money can beget money and its offspring can beget more, and so on." Thus, a given sum of money on which interest is compounded annually at $3\frac{1}{2}$ per cent will double itself in about twenty years.

Budgets. The only certain way in which a family or an individual can save money regularly is by budgeting income and expenses. This means keeping a record on a yearly or monthly basis of the amount of the income and the expenditures for which it is supposed to provide. A blank book should be secured, and the amount of income entered on one page. On the opposite page should be listed the regular definite living expenses, itemized and with the proper amount put down under each item. For instance, there should be a place for the expense of rent, another for food, another for clothing, another for operating, and another for savings. These are the main heads, but there will be other divisions in most budgets covering such items as recreation, doctors' and dentists' fees, and miscellaneous. At regular intervals the amounts which have been set down as probable expenditures under the various items should be checked against the actual expenses. In this way one can readily see what expenses, if any, are higher than they should be and the necessary correction to be made. An example of a typical budget follows:

BUDGET FOR INCOME OF \$200 A MONTH

Four in the Family¹

		Per cent
Food.....	\$70	35
Shelter.....	50	25
Clothing.....	28	14

Operating ²	18	9
Insurance.....	14	7
Development ³	12	6
Investment ⁴	8	4
TOTAL.....	\$200	100

¹ For each additional person in the family approximately one fourth of the amount budgeted for food and clothing should be added.

² Operating expenses include heat, light, laundry, telephone, household supplies, etc.

³ Development includes medical attention, education, charity, recreation, lodge dues, automobile, etc.

⁴ Investment includes savings in banks, building and loan associations, or securities.

Employee Thrift Plans. Since early in the last quarter of the nineteenth century increasing efforts have been made by employers to help their employees save money. Except for a temporary decline during the depression (1930-1936), employee thrift plans have continued to spread in large and small business and industrial organizations.

Employers sometimes contribute money or assist employees in other ways, such as by making authorized payroll deductions under these plans.

The following are the most usual types of employee thrift plans:

1. Employee Deposit Plans where savings are either deposited in a bank, or handled by the employer.
2. Employee Stock Purchase Plans providing for installment purchase of company stock by employees.
3. Employee Building and Loan Associations.
4. Employee Credit Unions which are co-operative associations, usually managed by employees and operated under Federal or state charter.

In general, Credit Unions seem to have survived the depression better than the other types of plans.

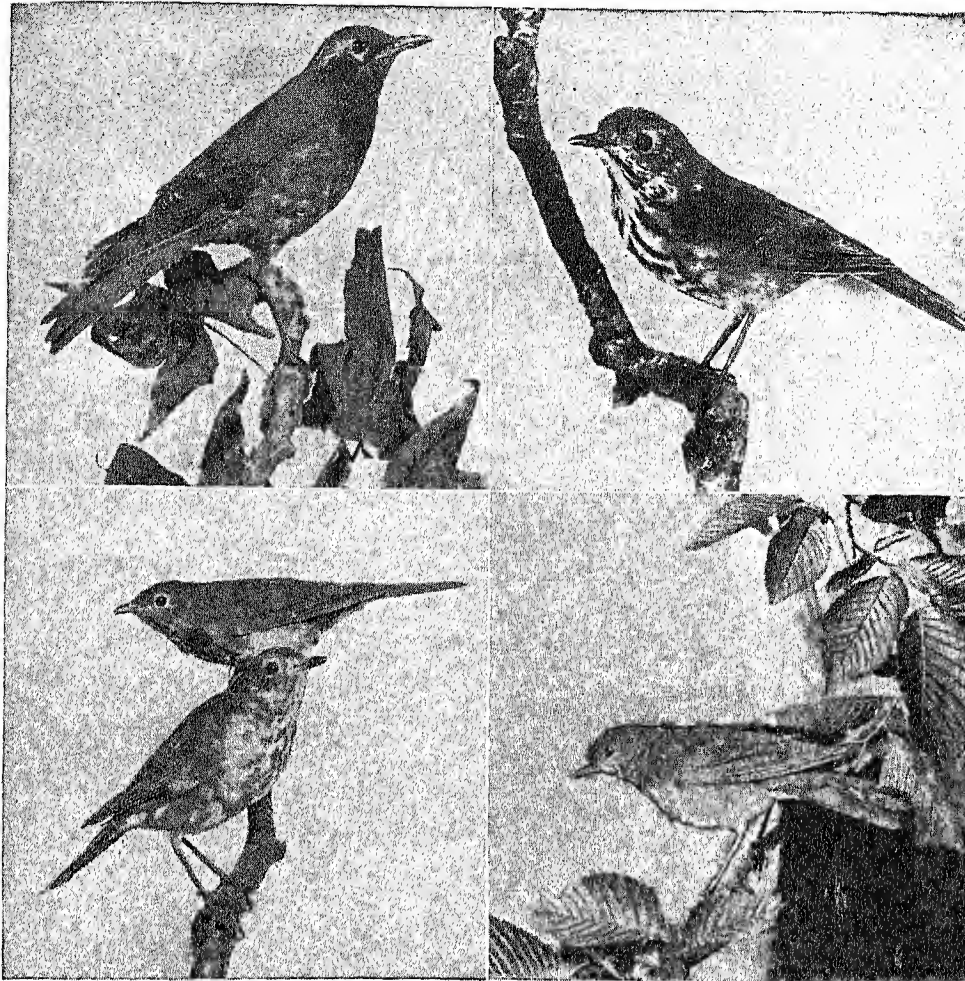
Other Aspects of Thrift. Although this article has been largely devoted to that form of thrift which has to do with the saving of money, thrift has a much broader application than this. Thrift means, for instance, the wise spending of money as well as the saving of it. It means economy in the use of food; the conservation of forests and other natural resources.

Economy is largely an attitude of mind. Continued prosperity is impossible without foresight and economy. As Abraham Lincoln said, "Prosperity is the fruit of labor. Teach economy. That is one of the first and highest virtues. It begins with saving money." J.E.K.

THROMBOSIS. See APOPLEXY.

THROWING THE HAMMER. See HAMMER, THROWING THE.

THRUSH, one of a group of song birds found in all parts of the world. The numerous species include various plain brown birds, with whitish and usually spotted breasts, besides the robins, wheatears, and bluebirds. Thrushes are migratory. They inhabit wooded regions, spending much time on the ground and feed-



Photos: Visual Education Service

O thrush, your song is passing sweet,
But never a song that you have sung

Is half so sweet as thrushes sang
When my dear love and I were young.
—MORRIS: *Other Days*.

From left to right, top and bottom: Wood thrush, hermit, olive-backed, and gray-cheeked thrushes.

ing largely upon insects, thus proving themselves of value to man. They are the highest order of songsters.

The largest and best-known North American species, barring the American robin, is the *wood thrush*, which has bright-cinnamon upper parts, and conspicuously spotted breast and sides. It is noted for its clear, flutelike songs. The wood thrush nests in the Eastern United States and Southeastern Canada, and winters in Central America. Its nest, built on the horizontal branch of a bush or tree, consists of leaves, twigs, etc., closely woven together, and having an inner wall of mud and a lining of fine rootlets. The eggs, which range from three to five in number, are of a greenish-blue color.

Other common species are the *Wilson thrush*, or *veery*, the *hermit thrush*, and the *olive-backed thrush*. In Europe the commonest members of the thrush family are the *redbreast*, or *English robin*, the *throstle*, or *song thrush*, the *English blackbird*, and the *nightingale*, the sweetest singer of all. See BLUEBIRD; NIGHTINGALE; ROBIN.

D.L.

Scientific Names. The thrushes belong to the family *Turdidae*. The wood thrush is *Hylocichla mustelina*; the Wilson, *H. fuscescens*; the hermit, *H. guttata*; the olive-backed, *H. ustulata*.

THRUSH, also called **SPRUE**, or infantile sore mouth, is a contagious disease of infants. It is caused by a fungus, and appears in the form of small, roundish, white patches, called *aphthae*, on the lining membrane of the mouth

and throat, and also on the tongue. These patches are slight elevations of the outer layer of the mucous membrane; they cover drops of watery fluid, and contain the fungous growth. When they peel off, a raw, red surface is left. As fresh patches continue to appear, the mouth becomes sore, and suction is painful for the infant. At the onset, thrush is usually accompanied by fever, colic, and diarrhoea. The disease usually runs for about ten days. It rarely occurs in infants of normal health, and is dangerous only when the aphthae become gangrenous. Preventive treatment requires absolute cleanliness of nipples and nursing bottles, with sterilization of milk and other food. On the appearance of the aphthae, the mouth may be thoroughly, but gently, washed with a solution of boracic acid, potassium permanganate, or other mild antiseptic.

THUCYDIDES, *thu sid' ih deez*, a Greek historian of the fifth century B.C., celebrated as the first to write from a critical standpoint. His great masterpiece, *A History of the Peloponnesian War*, has been divided into eight books, the last of which concludes abruptly and bears evidence of not having been carefully revised. The narrative covers twenty-one of the twenty-eight years of the war, the period from 431 to the middle of 411 B.C. It is a terse, impartial record of the conflict, and a striking testimony to the author's painstaking efforts to present accurate information. As the events are given according to the record of each summer and winter, they are not always properly grouped, but on the whole the history is one of the best available sources of information on that period. The author is admired for his skill in analyzing character and his ability to show the relation between cause and effect.

Thucydides was born in Attica. His father, Olorus, belonged to an aristocratic and wealthy family, which was the possessor of rich Thracian gold mines. During the Peloponnesian War, in 424 B.C., Thucydides was in command of part of the Athenian fleet, but his failure to relieve the siege of Amphipolis made him an exile for twenty years. He returned to Athens in 403 B.C., shortly after the close of the war, and it is supposed that he died two or three years later.

THUGS, from the Hindustani *thag*, meaning a cheat or rascal, was the name first applied to a religious society in India which was in effect a confederacy of professional assassins. The

thugs committed murders and plundered victims in honor of Kali, the Hindu goddess of destruction, and wife of Siva (which see). According to legend, they formerly believed that Kali assisted them in disposing of the bodies of their victims by devouring them, but when one of the fraternity became curious and pried into the proceedings of the goddess, she became angry and condemned them in the future to bury their victims. They frequently murdered by strangling. The native Indian and the English governments joined in efforts to suppress thuggee—the practice of the thugs—at various periods, and in 1831 the British authorities adopted strenuous measures to put an end to the evil. It is now practically wiped out.

Use of the Word To-day. In America, a thug is a "hold-up" man, or highwayman, or a so-called "gunman." The connection between these modern individuals and the traditional Indian character is based on the fact of their common mercilessness.

THULE, *thu' le*, or, more commonly, **ULTIMA THULE**, the name usually given in ancient literature to the most northern of habitable or known lands. Some writers say that Norway or Iceland was meant; others, that the name was given to the largest of the Shetland Islands. Symbolically, *Ultima Thule* has been used to designate any very distant or mysterious region; also, a remote goal or end, as the *ultima thule* of one's ambition.

THULIUM. See **CHEMISTRY** (The Elements).

THUMB, TOM. See **DWARF**.

THUMB RINGS. See **RING**.

THUN, toon, LAKE OF. See **SWITZERLAND** (Waters).

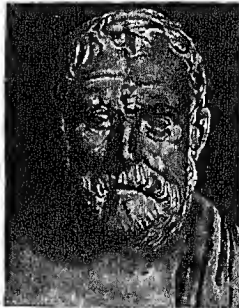
THUNDER. See **LIGHTNING** (Why Thunder Follows Lightning).

THUNDER BAY RIVER, a stream of northern Michigan, emptying into Lake Huron.

THUNDER-PUMP. See **BITTERN**.

THUNDERSTORMS. See **RAIN** (Lands That Always Have Rains).

THURMAN, ALLEN GRANBERY (1813-1895), an American lawyer and statesman, United States Senator from Ohio for twelve years, was born at Lynchburg, Va. His parents having removed to Ohio when he was six years old, he attended the academy at Chillicothe, studied law in his uncle's office, and on admission to the bar, in 1835, became his uncle's partner. He soon entered politics, and was elected to Congress in 1845, serving one term. Successful at the bar, he was elected judge of the supreme court of Ohio in 1851, and became chief justice in 1854. He was Democratic candidate for governor in 1867, but was defeated by Rutherford B. Hayes. From 1869 to 1881, he served in the United States Senate, and was its recognized Democratic leader. He was a candidate for the Democratic nomination for President in 1876, 1880,



THUCYDIDES

and 1884, and in 1888 was nominated for Vice-President on the Cleveland ticket, which was defeated.

THURSDAY, the fifth day of the week, literally *Thor's day*, sacred to the ancient Scandinavian or Teutonic god of thunder. This is probably a translation of the Latin *dies Jovis*, meaning *Jove's day*, Jove or Jupiter being the corresponding Roman god. In the United States, the last Thursday in November is celebrated as Thanksgiving Day. Maundy Thursday, also called Holy Thursday, is the day preceding Good Friday. See **THOR**; **WEEK**.

THWAITES, *thwáys*, **REUBEN GOLD** (1853-1913), an American historian, born at Dorchester, Mass. He removed to Wisconsin in 1866, and attended high school, but his college work, in preparation for a postgraduate course at Yale, he did by himself. In 1876 he was made managing editor of the *Wisconsin State Journal*, at Madison. From 1886 until his death, he was secretary and superintendent of the State Historical Society of Wisconsin, and editor of its publications. Besides his part in making the Wisconsin State Historical Society efficient beyond those of many other states, his greatest work was the editing of the seventy-three volumes of *The Jesuit Relations*. This is considered by authorities one of the most excellent examples of scholarship ever shown by an American historian.

Historical Books. Among his published volumes are *Down Historic Waterways; The Story of Wisconsin; The Colonies, 1492-1750; On the Storied Ohio; Stories of the Badger State*; and biographies of Daniel Boone, Marquette, and George Rogers Clark.

THYLACINE, *thy' lah sin*. See **TASMANIAN WOLF**.

THYME, *time*, a fragrant garden herb belonging to the same family as the mints, cultivated in gardens as a flavoring. Its scent is due to an oil contained in the leaves and stems, from which is prepared the drug thymol, used as a remedy for intestinal troubles and for hookworm disease. The plant grows from six to ten inches high, and has square, hairy stems, narrow leaves, and small lilac or purplish flowers, borne in separate whorls. A variety known as *creeping thyme*, with woody, branching stems, makes an admirable cover for rocks and waste places. There is an old tradition that, at midnight in midsummer, the king of the fairies and his followers frolic in beds of wild thyme. Oberon, king of the fairies in Shakespeare's *Midsummer Night's Dream*, says:

I know a bank whereon the wild thyme blows,
Where ox-lips and the nodding violet grows. B.M.D.

Scientific Names. These plants belong to the family *Menthaceae* (or *Labiatae*). Garden thyme is *Thymus vulgaris*; wild thyme is *T. serpyllum*.

THYROID. See **GLANDS** (Ductless Glands); **CHILDHOOD, BEHAVIOR IN; ZOÖLOGY** (How Zoölogy Affects Human Welfare).

THYROID CARTILAGE. See **LARYNX**.

THYSANOPTERA. See **INSECT** (Classification).

THYSANURA. See **INSECT** (Classification).

TIAN SHAN, *te ahn' shahn'*, OR **TIEN SHAN**, *te en' shahn'*, **MOUNTAINS**, a mountain system of Central Asia, commencing in Russian Turkestan and extending nearly 1,500 miles in an easterly direction to the Desert of Gobi. It is closely connected with the Altai system, and divides the watersheds of Lake Balkash and the Terim River. The system consists of a series of ranges running parallel to each other, with a breadth of about 200 miles. The highest peak is Khan-Tengri, rising 24,000 feet above sea level.

There are numerous roads and passes over the mountains, connecting China, West Turkestan, and Persia. These routes are extremely dangerous in winter, owing to snow and ice. All peaks 11,500 to 12,500 feet above sea level are snow-clad, and have numerous extensive glaciers. The mountains contain vast mineral wealth, almost entirely undeveloped.

TIBBUS, *tib' ooz*. See **SAHARA**.

TIBERIAS, *ti be' rih as*, **SEA OF.** See **GALILEE**.

TIBERIUS, [TIBERIUS CLAUDIUS NERO CAESAR] (42 B.C.-A.D. 37), the second Roman emperor, the son of Tiberius Claudius Nero, an officer under Julius Caesar, and Livia, who afterward was the wife of Augustus. His mother used her powerful influence to secure the advancement of Tiberius and his younger brother Drusus, and the former won considerable distinction in the army, carrying on successful campaigns in Germany and Gaul. Tiberius was compelled by Augustus to divorce his wife, Vipsania Agrippina, to whom he was devoted, and to marry Julia, the emperor's daughter. For a time after this, he lived in seclusion at Rhodes, but he returned in A.D. 1 and again took charge of the army. Although he had no affection for Tiberius and felt little confidence in him, Augustus adopted him and designated him as his successor, Drusus, the emperor's favorite stepson, having died in the meantime.



TIBERIUS

Augustus, lacking a male heir, first adopted his younger stepson, Drusus, who died 9 B.C., owing to a fall from his horse. In A.D. 4, he adopted Tiberius, and was succeeded by him as emperor in A.D. 14. [From a bust in the Museo Nazionale, Naples.]



Photo: Visual Education Service

AN ISLAND IN THE TIBER, IN THE CITY OF ROME

Like so many of his successors, Tiberius at first governed well. Throughout his reign, all the provinces of the empire were especially prosperous. In Rome, however, he showed a growing suspicion of possible rivals, and increasing cruelty. Spies were stationed everywhere, to report any opposition to the emperor, and all who were even under suspicion were punished with death. Postumus Agrippa, grandson of Augustus; Germanicus Caesar, the popular nephew of Tiberius; Tiberius' own son, Drusus Caesar—all were put to death because the emperor feared them; and his own death at Capri, at the hands of Macro, was but the final act of violence of the reign.

Tiberius was a man of undoubted genius, clear of judgment, tenacious of purpose; but he was cold, unloving, and fond of shrouding all his acts in mystery. Thus he became hated by the people, although his strict economy kept taxes low; and the accounts of him which remain are doubtless darker than his real character would warrant.

Named in the Bible. Tiberius is mentioned once in the Bible, and the fact serves as a connecting link between so-called Scripture and profane history of the period. In *Luke* III, 1-3, is the statement that, in the fifteenth year of Tiberius, the word of God came to John the Baptist. It is known from other sources that John was then about thirty years old and that Jesus was only six months younger; this mention therefore serves as important data for determining the time of the birth of Christ.

A Reference. For the part played by Tiberius in the line of emperors, see *ROME* (History).

TIBER RIVER, the historic stream on which lies the city of Rome. In ancient writings, it was frequently called "Father Tiber," suggesting the affection with which the Romans regarded it. It was also known as the "Yellow Tiber," referring to the color of the water, whose swift current carries downstream great quantities of sand and mud. This sediment, deposited century after century at the mouth of the river, has built up the land until, at the present time, the harbor is four miles farther out than in the days of ancient Rome.

The Tiber is the second largest river of Italy, ranking next to the Po. It rises in Tuscany, in the Apennines, 4,160 feet above sea level, and after a winding course of 253 miles, empties into the Tyrrhenian Sea (an arm of the Mediterranean), about twenty-six miles below Rome. It enters the sea by two branches, one of which is a channel excavated by the Emperors Claudius and Trajan. These two arms surround an island known as the Isola Sacra. Under normal conditions, the river is navigable for small steamers as far as Rome. In times past, the Tiber has frequently overflowed its banks; the flood of 1900 caused great devastation. Since then, costly embankments have been constructed at Rome. The river drains an area of 6,719 square miles.

TIBESTI, *tih bes' te*, a mountain range in the Sahara (which see).

TIBET, *tih bel'*, NOT THIBET, a country of Central Asia which has long been nominally a part of China, but which in reality possesses

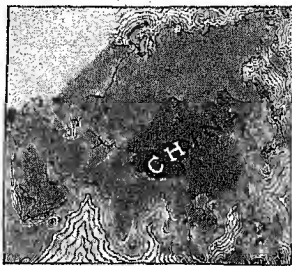


Photos: Visual Education Service; O R O O

Cheerful Tibetans in a Dreary Land. At top, a typical family of Tibet. Below, left, a girl in holiday attire; right, the same girl showing headdress, consisting of a length of sheep's wool, with skin, woven into her hair on each side of her head. The ornaments on the strip of leather are turquoises, which represent her savings.

an almost independent government. It has been aptly called "the roof of the world," for it is the most elevated large area on the globe. It is as large as that part of the United States east of the Mississippi River and north of Tennessee; however, because of physical conditions, the country contains fewer inhabitants than the single state of Massachusetts, the population being probably less than 3,000,000. The inhabitants call their country Bod, or Bhöt.

The maps accompanying ASIA, in these volumes, tell at a glance something of the story of Tibet. At the south, the Himalaya Mountains send upward the tallest peaks in the world. On the north and north-west, the Kun-lun range ascends to a height of 20,000 feet. Enclosed thus on three sides by towering walls, the table-lands of Tibet have an



LOCATION MAP

Tibet comprises a large but comparatively unimportant part of China. For political map, see CHINA (map). average elevation of fully 16,000 feet. The Brahmaputra River, in Tibet called the Tsangpo, flows over a thousand miles eastward, to find its Indian outlet to the sea.

The People. The very small population is explained in large measure by the foregoing facts; also, the mountains limit the rainfall to a very few inches a year, so that thousands of square miles are a dreary expanse of sand and gravel; over which violent winds blow at all seasons. There are hundreds of lakes, but they are in dreary surroundings, and most of them are salty, because of absence of rain.

The people have not been greatly influenced by their surroundings, for they are a cheerful and pleasure-loving race, especially fond of theatrical entertainments and horse-racing.

Their Religion. Tibetans are very religious; they profess Lamaism, an offshoot of the Buddhist faith. Raising large families and increasing the number of households is a serious matter, because of the difficulty of making a living, so thousands of young men become monks and lead a celibate life in monasteries. The monks are called *lamas*, and Tibet holds half a million of them.

Among the people who marry, the system called *polyandry* exists; one woman will often marry from two to half a dozen men—usually all the brothers of one family. The average number of husbands is three. The wife may dismiss a husband at will, and a discarded mate is thereafter an outcast from society. Tibetan

men, it is said, are beginning to protest strongly against domination by women. The latter are prominent in the management of shops and general retail trade.

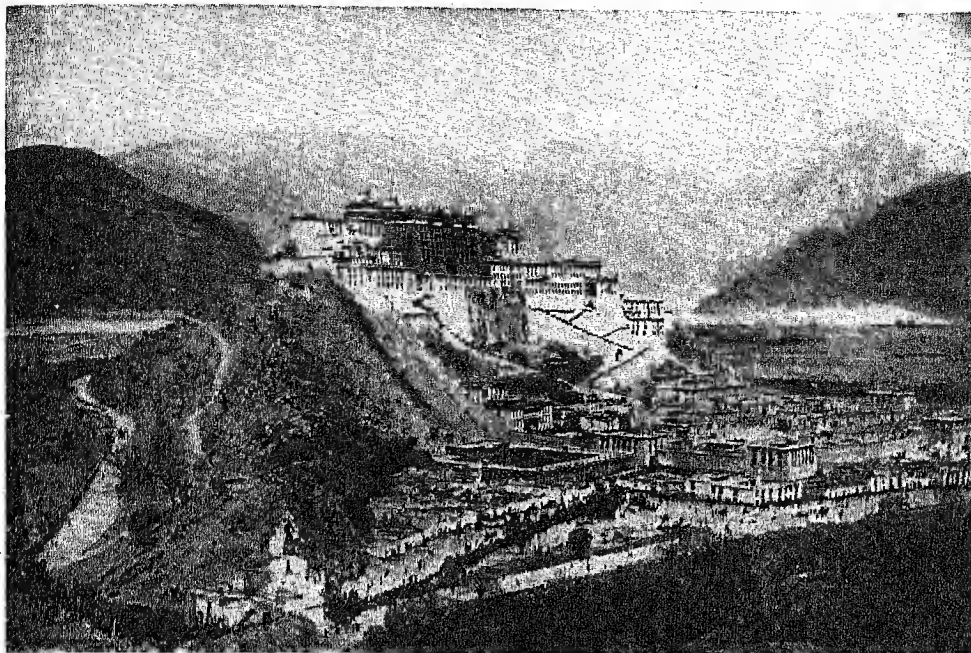
The Capital. The only city of importance is Lhasa, the capital.

Lhasa, *lah' sah*, is the holy city of the Tibetans, and is also known as "the Forbidden City," because its sacred temples have always been guarded zealously from white people; only two or three Caucasians, until recently, have ever entered it. Lhasa proper is a closely packed assemblage of stone and brick dwellings and shops, interspersed with many temples. About fifteen monasteries are scattered through the suburbs and over the plains. The curiously constructed houses have low, flat roofs and no chimneys; paper, oiled or plain, serves for windows. At night, light is furnished by torches or primitive lamps fed with vegetable oil. The women stain their faces with black spots. Besides being a great religious center of the Buddhist faith, Lhasa is important as a trading center, being the terminus for caravans to and from India, Kashmir, Burma, China, Mongolia, and Turkestan. Tea, silks, carpets, rice, and tobacco are the chief articles of commerce. The resident population, not including the garrison and the monks, is about 15,000, although this number is greatly increased by a floating population of pilgrims and traders, making the total population from 40,000 to 50,000.

Resources. It is possible to live but a few months of the year in the high altitudes; while there, the people raise sheep and yaks, and these they drive lower down, when the short, warm season is over. In the valleys there is vegetation, but it is not plentiful enough to meet the demands of the population. Barley is the staple crop, for it will grow in cooler climates than any other grain except rye, and it is the principal foodstuff. There is some mining, gold, silver, iron, and copper being found.

Europeans Excluded. During the nineteenth century, Europeans were practically prohibited from entering the country, and were speedily expelled if found within it. Some explorers, however, succeeded in visiting some districts, and one of these, W. W. Rockhill, an American, added largely to the world's knowledge of Tibet and its people. Since World War I, English representatives from India have been welcomed in Lhasa.

Government and History. Because it is inaccessible, Tibet is difficult to govern from Peking or Nanking, especially in view of the opposition of the people to China. The civil and religious authority is the *Dalai Lama*, or *Grand Lama*, who rules from Lhasa. For years the Chinese government has worked steadily to bring Tibet under control of China, but Chinese authority is felt but slightly in the country, and the people appear to care little what happens to the remainder of China; indeed, they have practically maintained independence since 1912. Although the dalai lama



RESIDENCE OF THE RULER OF TIBET

The most splendid structure in the country is the home of His Highness, the Dalai Lama, in Lhasa, the holy city of Tibet. Clustered near the foot of the hill on which the royal palace stands are homes of rich Tibetans. There are few of these; nearly all the people live lives of hardship.

and his ministers were forced to flee to India in 1910, the Tibetans were successful in 1912 in keeping the Chinese troops out of Tibet. In 1913 the Chinese attempted to negotiate with the Tibetan government. The Tibetans demanded that a British representative be present at the conference. The agreement drawn up was refused by China, but hostilities were suspended, pending renewal of the negotiations.

Fighting was renewed in 1917, and the Tibetans succeeded in capturing territory as far east as the Yangtze River. By a truce signed the following year Tibet retained this territory. War with China again broke out in 1931. With the death of the Dalai Lama in 1933 the struggle for religious and civil power in Lhasa was intensified. Six years later, the finding of his successor was announced. Under a regency which is to rule until he is eighteen, a six-year-old peasant boy, Lingerh Lamutanchu, from Chinghai, China, was enthroned as the fourteenth Dalai Lama in February, 1940. Relations with the Chinese (nationalist) government were thereby strengthened.

Related Subjects. The reader is referred to:
 Brahmaputra River Kunlun Mountains
 Himalaya Lamaism

TIBIA, a bone of the leg. See **SKELETON**.

TICAL, *tih kahl'*, a standard coin in Thailand. See **MONEY** (Foreign Monetary Standards).

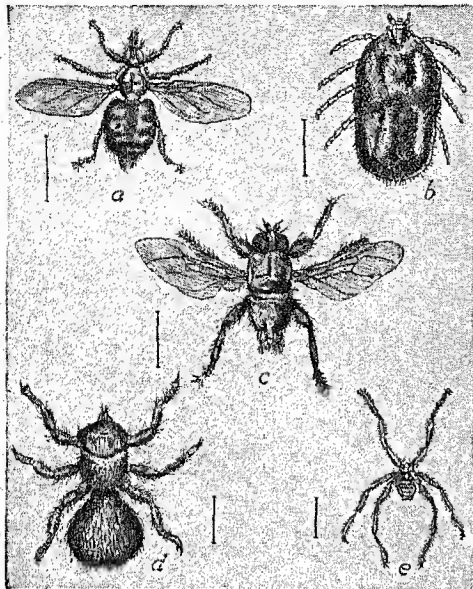
TIC DOULOUREUX, *tik doo loo roo'*, a French term meaning *painful twitching*, is the name of an acute form of facial neuralgia. There are usually shooting pains on one side of the face, which last only a few moments, but recur frequently. Warm applications or electrical treatment with iodides will sometimes relieve the pain. Real cure depends on finding the cause. Facial neuralgia often originates in diseased teeth or tonsils, or is due to an infected area elsewhere in the body. Another possible cause is pressure on a nerve, producing pain by reflex action. Persistent neuralgias require a thorough examination by a competent physician. See **NEURALGIA**. W.A.E.

TICINO, *te che' no*, the ancient name of Pavia. See **ITALY** (The Cities: Pavia).

TICINO RIVER. See **SWITZERLAND** (Waters).

TICK, an oval-shaped parasitic animal belonging to the same class as mites, spiders, and scorpions (see **ARACHNIDA**). With mites (which see), the ticks form an order of arachnids of great economic importance, for they are responsible for various diseases of men and domestic animals. Ticks are chiefly injurious because they often carry in their bodies certain disease germs which they transmit to the blood of their victims. Sometimes the bites of ticks are in themselves poisonous, and cases of paralysis are known to have followed their attacks, but such effects are not very common.

Ticks and mites are much alike in body structure, the name *tick* being applied to the larger species of the order (*Acarina*). Most of the forms called ticks may be seen without a glass, even in the larval stage. Many of the mites are microscopic. Ticks live only on animal fluids, but some of the mites feed on plant juices and tissues, and on plant products. The



TICKS

The illustrations show ticks found on (a) birds; (b) cattle; (c) sheep; (d) horses; (e) bats. The perpendicular lines indicate actual adult sizes. The sheep tick is not a true tick, but is a specially modified insect.

bodies of these arachnids are seemingly all in one piece, though in some species a groove is found between the abdomen and fore part of the body. Ticks have a movable process at the anterior end that serves as a head. The blood of their victims is drawn through a beak equipped with strong recurved teeth that enable the parasites to cling to their hosts most tenaciously. In the adult form, the ticks have eight legs, extended sidewise in the manner of a crab's.

The males and females mate on the bodies of the animal hosts, but only the female sucks blood. Her flat, six-legged larvae are hatched from eggs laid in dead leaves or other ground rubbish. The larvae alight on passing animals from grass stalks and shrubs, and after gorging themselves with blood, with which they become greatly distended, they cease to eat, molt, and are changed into eight-legged nymphs. After another molting, the nymphs are transformed into adults, capable of reproduction. In some species, the larvae and nymphs drop to the

ground to undergo each change of form, and the female always does so to lay her eggs.

Kinds of Ticks. While the various species are given special names, as *cattle*, *dog*, or *sheep* tick, very few are restricted to one kind of host, and many that attack animals are also annoying to man. There are eight species that are pests on cattle in the United States (see **CATTLE TICK**).

In the Northwestern states, a disease of man called *spotted fever* and *Rocky Mountain fever* is transmitted by *Dermacentor venustus* and related species (spotted-fever ticks). *Argas persicus*, the miana bug of Persia, infests houses and is said to kill human beings with its bites. It also carries disease germs to poultry, and is identical with certain species that are common pests of poultry in the Southwestern states. The common English sheep tick, *Ixodes ricinus*, also infests dogs and cattle. This and related species are found in America.

Persons walking and camping in the woods are often troubled by *wood ticks*. If these pests are pulled out forcibly, the toothed beak will be left inside the flesh, and possibly cause a festering sore. The best way to get rid of the intruders is to drop gasoline, kerosene, or chloroform on them, whereupon they will loosen their hold and come out easily. S.H.S.

TICKER. See **STOCK TICKER**.

TICKWEED. See **PENNYROYAL**.

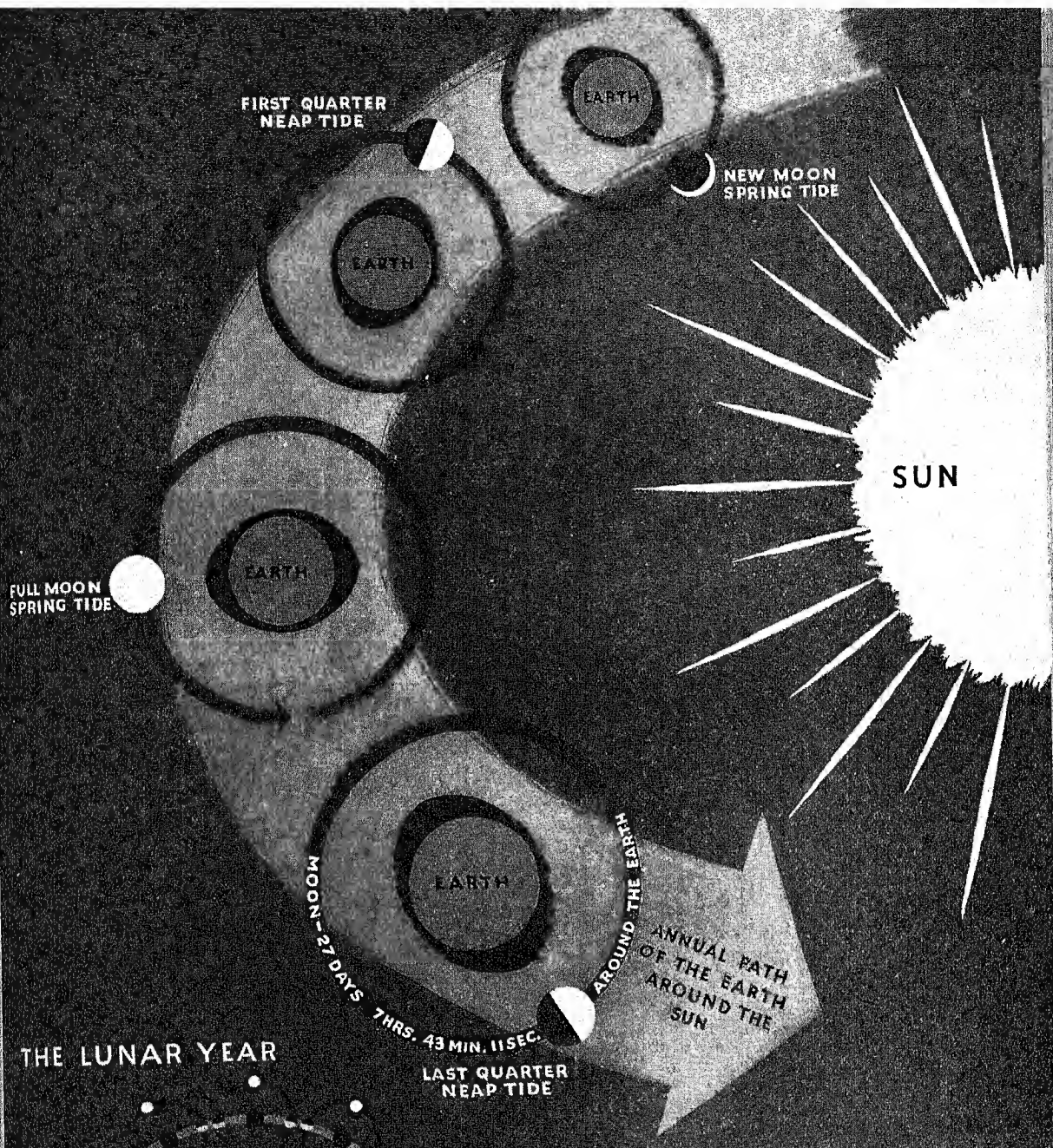
TICONDEROGA, *ti kon dur o' gah*, **BATTLE OF.** See **REVOLUTIONARY WAR**; ALLEN, ETHAN.

TIDAL AIR. See **BREATH AND BREATHING** (Lung Capacity).

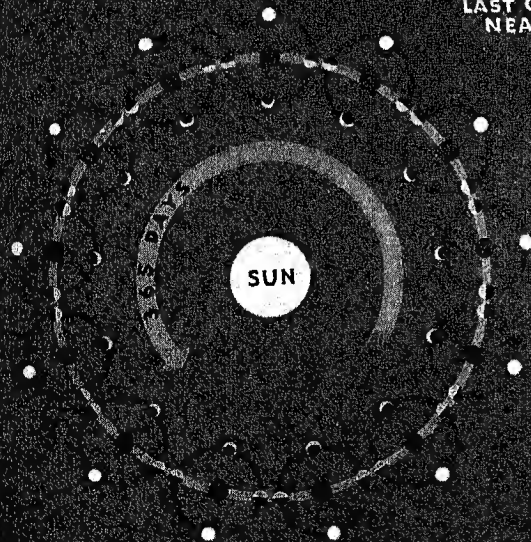
TIDAL RACE. See **TIDES**.

TIDES, the periodic rise and fall of ocean waters, observed on most seacoasts twice a day. Centuries ago, before many of the familiar facts of astronomy and physical geography were known, these daily movements of the ocean were watched with awe; the reason for the phenomenon was eagerly sought by the wise men. It was a problem, however, that baffled philosophers until the seventeenth century, when Sir Isaac Newton furnished the key to the solution, with his theory of gravitation. According to this principle, every particle of matter in the universe during every instant of time is attracting every other particle. Tides are caused by the attractive force of the sun and moon, as it is exerted on the earth. That is, these bodies pull upon the earth in such a way as to cause a piling up of the water envelope; the effect on the solid earth is, of course, not discernible, for the land envelope acts as a rigid body and does not perceptibly yield to the pulling force, although the force is present. It is constant and unalterable. While Newton's explanation of gravitation has been called into question by Einstein (see **EINSTEIN'S THEORY OF RELATIVITY**), the theory as applied to the tides is the most reasonable that any one has put forth.

The course of the daily tide is as follows: There is a gradual rise for about six hours, and then the water remains stationary for a short

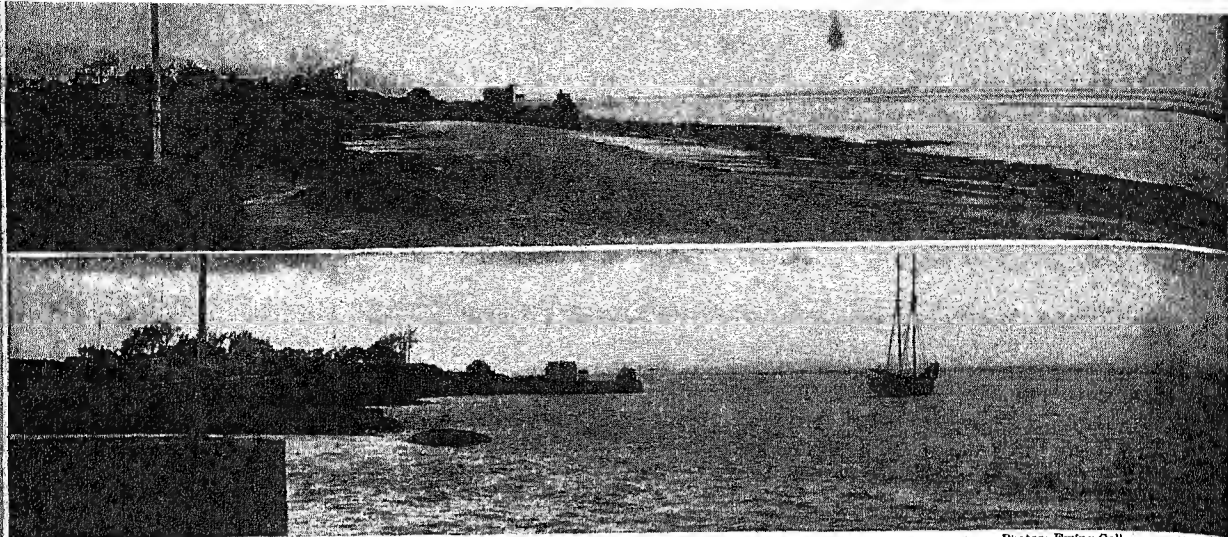


THE LUNAR YEAR



SUN, MOON, AND TIDES

Ocean tides are caused by the pull of the sun and moon. Each body of matter, including sun, moon, planets, and stars, attracts every other body, the force of attraction depending on relative size and distance. Although the sun is 26,000,000 times heavier than the moon, its effect in causing tides is only five elevenths as great, for it is about four hundred times farther from the earth. When both sun and moon pull in the same direction (see New Moon) or in opposite directions (see Full Moon), high or *spring* tides occur as shown. In other parts of the earth *neap* tides, which do not rise as high or ebb as far, occur. During its first and last quarters, the moon does not pull in the same direction as the sun. As its pull is stronger, spring tides occur on the side of the earth nearest the moon and on the opposite side, with neap tides elsewhere. During the year, the moon travels around the earth thirteen times (*left*), so there are twenty-six spring and twenty-six neap tides during that time at any coast town.



Photos: Ewing Galloway

HIGH AND LOW TIDES

Twice in every twenty-four hours the water of the sea ebbs (falls) and flows (rises). It is high tide, or high water, when it is at its highest point; it is low tide, or low water, when it is at its lowest position.

time. Then it begins to recede, and continues to fall for the succeeding six hours. The highest stage is called *high tide*, and the lowest, *low tide*. The landward movement is called *flood tide*, and the receding one, *ebb tide*. These terms have been applied to the wave movements as observed on shores, for it is difficult to distinguish the tides out in the open sea. There are two high and two low tides within a little more than a solar day, the average interval between two successive high tides being about twelve hours twenty-five minutes. The hours of high and low tides vary from day to day; they occur at the same hour only once in each lunar month.

According to Newton, the sun exerts a greater attractive force on the earth than the moon, because of its immense size (see GRAVITATION). This difference in size offsets the difference in distance, and the sun pulls the earth with 175 times the force that the moon does. However, the moon has a greater *tide-producing* force. Varying heights of lunar and solar tides are due to the difference between the pull of the moon and that of the sun on the earth's center, and on the portions nearest to and farthest from the center. Since the diameter of the earth is 8,000 miles, the sides of the earth nearest the sun and moon and farthest from them are 4,000 miles nearer to and farther from the sun and moon than is the earth's center. Relatively, of course, this difference of 4,000 miles is much more important in a total distance of 240,000 miles (the moon's distance) than in 93,000,000 miles (the sun's distance). Since the differential pull of the moon is greater than that of the sun, the moon's pull raises the greater tides. See MOON.

When the sun and moon are pulling in the same straight line, as at full moon or new moon, the effects of the solar high tide are added to those of the lunar high tide, and the

result is a tide higher than the average. Such tides are called *spring tides*. At the same time, there is a corresponding low ebb tide. When the sun and moon act at right angles, the solar high tide occurs at the same point as the lunar low tide, and prevents the latter from being as low as usual; the solar low tide, however, lessens the force of the lunar high tide. These moderately high and low tides are called *neap tides*.

When the tidal wave enters a wide-mouthed channel or estuary converging inland, the waters pile up as they pass the narrowing shores, and a rushing stream, called a *bore*, is formed. In the Bay of Fundy, the tidal wave sometimes reaches a height of fifty feet. Bores also occur in the Amazon, the Ganges, and in numerous estuaries of the British Isles. Another phenomenon of tide waves is the *tidal race*, formed when the tide rises to different heights in two bodies of water joined by a narrow channel. Such tides are often very dangerous to shipping.

Tides are of value in keeping the otherwise stagnant waters of bays and harbors in movement. Large steamers usually leave port at high tide. In some landlocked harbors all vessels must wait for the flood. Mariners' charts show the variations in tide for all harbors and are carried by all tidewater vessels. R.H.W.

See also FUNDY, BAY OF.

TIE, in music, a slightly curved line which connects two like notes or tones. See MUSIC (Ties and Slurs).

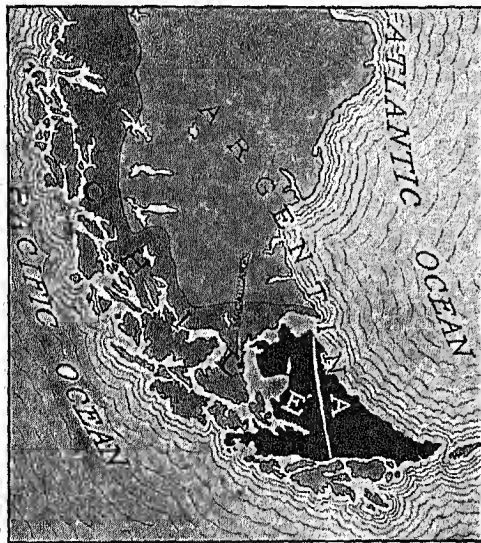
TIENTSIN, *te en' tseen'*, a Chinese city in the province of Hopeh, first opened to foreign trade and settlement by a treaty negotiated in 1860, and now, next to Shanghai, the most important seaport. It lies on the Pei-ho, where that river meets the Grand Canal, and is about seventy miles southeast of Peking (Peiping). The native city, as well as the foreign settlement, suffered severely during the Boxer Re-

bellion, in 1900; afterward, the city walls were razed and the municipal services considerably improved. The foreign settlement, which is known as Rcd Bamboo Grove, is a modern city, with a fine driveway along the river, good streets, gas and electricity, attractive homes and public buildings, and schools, hospitals, clubs, and business enterprises. At the outbreak of war between China and Japan in 1937, the city was occupied by the Japanese. Estimated population, 1,292,025 (1936).

Tientsin has railway connections with Peiping, Changsha, Nanking, Shanghai, Manchuria, and Hankow. The import and export trade is very large, with both foreign and domestic ports. Exports include straw braid, furs, hides, camels' wool, tobacco, wood, and coal; the imports are chiefly woolen goods, jeans, sugar, rice, grain, petroleum, tea, opium, paper, steel, and salt.

TIERCE, *teers*, a term in fencing (which see).

TIERRA DEL FUEGO, *tyehr' rah del fwa' go*, an island group lying off the southern extremity of South America, from which it is separated by the Strait of Magellan, on which is the world's southernmost city, Magallanes (until 1920 Punta Arenas), with a population of 10,500. The archipelago was discovered in



TIERRA DEL FUEGO

1520 by Magellan. These islands have a total area of about 28,000 square miles, but over four-fifths of this territory is included in the area of one large island, sometimes known as King Charles South Land, but more generally as East Tierra del Fuego. The archipelago is divided politically into two sections, one the possession of Argentina and the other of Chile. The Argentine portion, 8,500 square miles, consists of the eastern part of the main island

and Isle de los Estados, or Staten Island, an isolated island on the extreme east. The western part of the large island and the rest of the archipelago, 19,500 square miles, belong to the Chilean Territory of Magallanes.

The small islands constituting the Chilean division end at the extreme south in Horn Island, on the southern end of which is the famous cape called by sailors "the Horn." See **HORN, CAPE**.

TIERRA CALIENTE, *tee' rra ka leen' te*. See **MEXICO** (Tropical Mexico).

TIFFIN, OHIO. See **OHIO** (back of map).

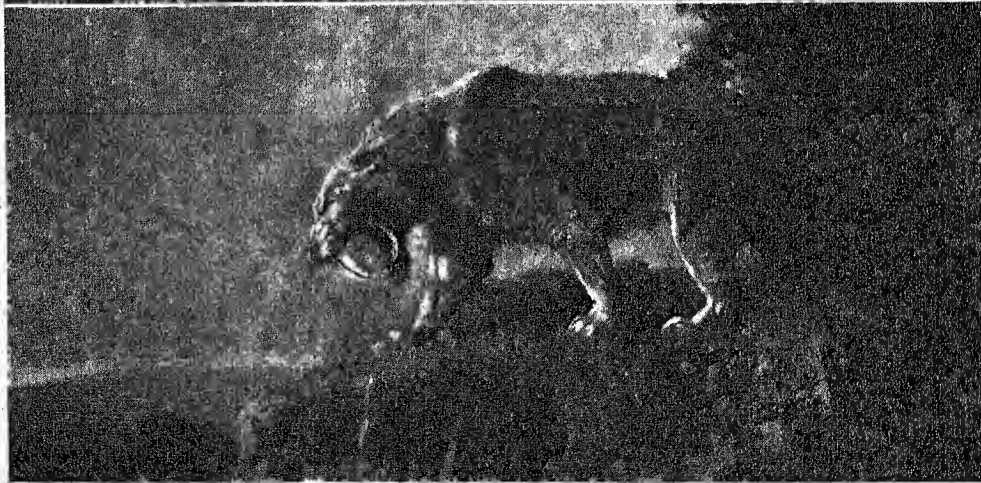
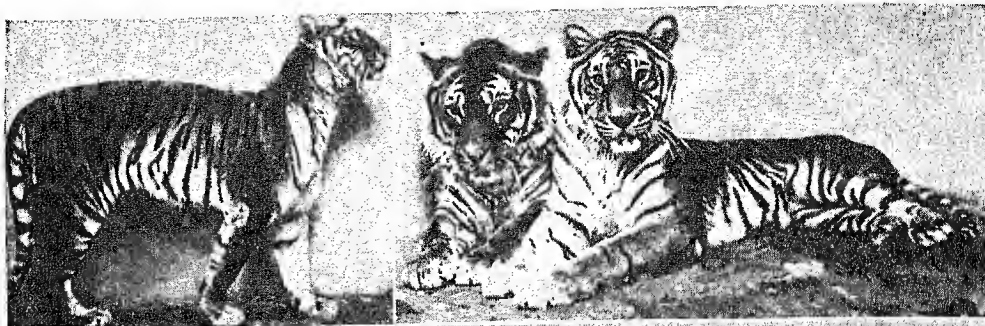
TIFLIS, *tye flyees'*. See **GEORGIA** (Georgian Soviet Socialist Republic).

TIGER, a lithe, beautifully marked jungle cat of Asia. For strength and fierceness, it has only one rival, the lion; while for cruelty and treachery, it probably has none. Rudyard Kipling, in his *Jungle Books*, makes a scarred tiger, Shere Khan, the outlaw of the jungle; he killed not only for need of food, but also for love of blood, and was feared by all the other animals for his viciousness and cruelty, and despised for his treachery. Though the story is highly imaginative, it probably presents a fairly accurate interpretation of tiger nature.

Appearance. In size, in the structure of the skeleton, in teeth, and in claws, the lion and the tiger are much alike, but there the resemblance ceases. The tiger has no mane and it cannot roar. Its coat is not dull fawn, but is bright fawn in color, shading to white underneath, and beautifully marked with irregular stripes of black. The largest tigers are found in India; those in Southern Siberia, Turkestan, Persia, China, and Japan, and those on the islands of Java and Sumatra, are smaller. The Indian tiger is sometimes as much as ten feet long from the tip of the nose to the tip of the tail, and its coat is very glossy and brilliant; the tigers of colder regions have a thicker, rougher fur, which is much duller in color.

Habits. The tiger is a carnivorous (flesh-eating) animal. In India its principal food consists of deer, wild pigs, antelope, young buffalo—for even the tiger fears the powerful old bulls—and cattle, to the number of about 32,000 in a year. The terrible "man-eaters," who have been known to kill as many as 130 natives in one year in India, are not the young, fierce beasts, but are old tigers whose first vigor has departed, and whose teeth are so worn that they find men even easier to kill than domesticated cattle. Sometimes a whole district will be deserted if a man-eater invades it, for attempts to destroy tigers by traps, pitfalls, spring guns, or poisoned arrows are not very effective.

The tiger usually hunts at night, unless it is ravenous, on which occasions it becomes extremely bold and will kill in daylight. It will climb trees occasionally, and it swims easily



The Tiger, Unrivalled for Cruelty. The three upper pictures present excellent views of the tiger and one method of bringing down its prey. At the bottom is the saber-tooth tiger of prehistoric times [illustration from American Museum of Natural History, New York].

and readily. It is reported that tigers will even swim from one island to another in search of a better hunting ground. The mother tiger is very affectionate, and often keeps her cubs, from two to six in number, with her until they are nearly two years old. As soon as they can no longer live on her milk, she prowls with them in the jungle, and teaches them to kill for themselves. Once they have learned to provide their own food, the cubs are abandoned by the mother, who may even eat one of them later, when food is scarce.

How Tigers Are Captured. Because tigers have their lairs in the jungle, where the grass and undergrowth are very high and dense, they cannot be successfully hunted on foot. Natives are sent out on foot to "beat" the bush and drive the tigers out of their hiding places into the open, where they are shot by white hunters mounted on elephants. Both beaters and elephants are mortally afraid of the tiger, for even the elephant's thick skin is not proof against the terrible claws of the great cat. This sort of big-game hunting is exciting and dangerous, for a wounded tiger sometimes springs upon the elephant's back to attack the hunters in the *howdah*, or cage. A much safer method is to tether a goat or some other live bait in a place where a tiger may be expected, and then to shoot it from a platform erected on poles or in a near-by tree. Tigers for zoos are caught by nets spread in their paths, or are trapped in grass-covered pits.

The average length of life of the tiger is twenty years. See CAT. M.J.H.

Scientific Name. The tiger belongs to the family *Felidae*. The species found in India is *Felis tigris*. Other forms are usually regarded as varieties or sub-species.

Related Subjects. The reader is referred in these volumes to the following articles.

Asia
Burma
Jaguar
Lion
Malay Peninsula

TIGER CAT.
See SERVAL.

TIGER LILY, a tall garden plant, native to Eastern Asia and believed to be the first lily brought to North America. It was named the tiger lily because the reddish-orange open flowers, splashed with black, suggest the color and markings of the tiger. The plant is pro-



THE TIGER LILY

duced from bulbs which are used for food in China and Japan. Its greenish-purple or dark-brown stem, often reaching a height of five or six feet, bears alternate, lance-shaped leaves, deeply veined from tip to base. At the point where they join the stalk, tiny black bulblets appear, which cling to the stem for a time, but finally drop off, producing other plants. See LILY, and color plate, facing 4005. B.M.D.

Scientific Name. The tiger lily is *Lilium tigrinum* of the family *Liliaceae*.

TIGLATH-PILESER, *tig lath pih le' zur*, the name of three Assyrian kings of whom the first and third are especially important.

Tiglath-Pileser I (about 1100 B.C.), one of the important kings of early Assyria, reigned about twenty-two years. His inscriptions tell of wide conquests in upper Mesopotamia, of the subjection of Babylonia, and of conquests in the west. He defeated Hittite groups and Aramaeans, and finally reached the Mediterranean Sea. Assur, the capital of the empire, was made beautiful through an extensive building program. Tiglath-Pileser I began to build a great empire but with his death came confusion and decline.

Tiglath-Pileser II (about 950 B.C.), a practically unknown king, who is credited with a reign of over thirty years. No annals have been preserved.

Tiglath-Pileser III (745-727 B.C.) was the first of a line of great Assyrian rulers. He came to power when Assyria was in chaos and left it a mighty empire. With a reorganized army he made ruthless conquests in every direction. In Babylonia toward the end of his rule he assumed the title of king, under the name of Pulhi. In the north Tiglath-Pileser fought with the powerful people of Urartu. In the east he campaigned against the Persian and Median tribes. In the west his conquests extended to the Mediterranean Sea. In 732 Damascus fell, indicative of what was soon to happen to the kingdom of Israel. Tiglath-Pileser III was succeeded by his son Shalmaneser V who continued the policies of his father. He, with his brother and successor, Sargon II, accomplished the destruction of the North Kingdom of Israel in 722 B.C. W.H.D.

TIGRIS RIVER. With its sister stream, the Euphrates, the Tigris formed the ancient valley of Mesopotamia, now Iraq, in Western Asia. Within this valley, according to tradition, was located the Garden of Eden, and on one of the heights northeast of this valley, the Ark of Noah is said to have rested. In Assyria and Babylonia, in the southern part of the Tigris-Euphrates basin, there developed two great civilizations of the ancient world, both of which flourished long before Greece and Rome came to power. The ruins of the ancient city of Nineveh, capital of Assyria, lie on the left bank of the Tigris, opposite the modern town of Mosul. See ASSYRIA (The Cities: Nineveh).

The Tigris rises from two main sources, which drain the region south of the Taurus Mountains. The main stream follows a winding, southeasterly course through the modern kingdom of Iraq, to Garbat Ali, and at this point unites with the Euphrates. The sister rivers



Photo: U & U

On the Tigris. The peculiar round basket-boat is called a *kufa*. People, animals, and freight of all kinds are carried in it across the river or downstream; it is not successfully paddled upstream when loaded.

then flow as one—the Shat-el-Arab—to their mouth on the Persian Gulf, seventy miles beyond. Formerly, the town of Korna, thirty miles above Garinat Ali, was the junction point, but the channel of the Tigris has been undergoing a change for many centuries. The total length of the Tigris is about 1,150 miles. It is navigable for steamers to a point about thirty miles south of Mosul, near the mouth of the Great Zab, but, in general, it presents great difficulties to navigation, the upper Tigris being navigable only for native rafts. The river flows over a bed of clay, sand, or conglomerate, and is full of obstructions. See EUPHRATES RIVER.

TILDEN, SAMUEL JONES (1814-1886), an American lawyer, statesman, and philanthropist, the opponent of Rutherford B. Hayes in the most closely contested Presidential election in the history of the United States. He was



Photo: U & U

SAMUEL J. TILDEN

born at New Lebanon, N. Y., and was educated at Yale College and at the University of the City of New York. He was admitted to the New York bar in 1840, and rapidly gained success. For two successive years, Tilden was a member of the State Constitutional Convention, and he served two terms in the New York legislature. Tilden figured prominently in exposing the graft and frauds of the famous Tweed Ring; he gained such popularity that he was elected governor of New York (1875-1876), and was the Democratic nominee for President in 1876.

In this election, there were said to be frauds in the elections of South Carolina, Florida, and Louisiana, and the settlement of the question by an electoral commission appointed by Congress resulted in a vote of eight to seven, in favor of Rutherford B. Hayes, Tilden's opponent. In 1880, and again in 1884, Tilden was offered the Presidential nomination, but he refused it on both occasions. The greater part of his fortune, estimated to be \$5,000,000, was bequeathed as a foundation for a public library in New York. The will was contested, and only about \$2,000,000 was used for the purpose.

Related Subjects. For details of the Tilden-Hayes episode, the reader is referred in these volumes to **ELECTORAL COMMISSION**. See, also, **TWEED, WILLIAM M.**; **HAYES, RUTHERFORD B.**

TILEFISH, a species of deep-sea fish first discovered in 1879 by fishermen engaged in cod trawling near Nantucket. These fish were seen again in 1880 and in 1881, and specimens were examined with great interest by the United

States Fish Commission, which reported their flesh to be excellent food. Large specimens are about three feet long and weigh about thirty pounds. The species was almost exterminated in March and April of 1882, when immense numbers of dead fish appeared on the surface



THE TILEFISH

of the water south of Long Island. It is supposed they perished in cold-water currents, forced southward by the heavy spring gales of that year. Special efforts were made to find surviving specimens and to propagate the fish, and, as a result, the species has been reestablished and is increasing in numbers. Their food consists preëminently of crabs, though they also eat squid, smaller fish, and mollusks.

The United States Bureau of Fisheries has given considerable publicity to the good flavor and fine texture of the tilefish. Fishing is carried on in dories, small, strong boats which are thoroughly seaworthy, and are carried by larger sailing vessels. Each dory is manned by two sailors, who row it out a mile from an anchored buoy, to which is attached a mile of fishing line having a thousand hooks. A ton and a half is considered an average catch for a sailing vessel. Before they are brought to land, the fish are cleaned and packed in ice. L.H.

Scientific Name. The tilefish is named *Lopholatilus chamaeleonticeps*, which means *crested tilus with a head like a chameleon*.

TILES, flat, curved, or tubular pieces of baked clay, glazed or unglazed, used for covering roofs, mantels, floors, and walls, as furnace linings, and in the construction of drainage pipes. The processes of manufacture are much the same as those employed for bricks. Coarse, rough clay is generally used in making the tiles for drainage pipes, and the pieces are tubular or semi-tubular. A continuous pipe is made by the overlapping of separate tiles, each of which has an extension at one end, for the purpose of fitting closely to its neighbor. Roofing tiles are of various shapes and colors, and are used very effectively in modern architecture. Wall tiles are made of fine grades of clay, of terra cotta, and sometimes of porcelain. Terra-cotta tiles are now often used as outer wall coverings for buildings, including some skyscrapers.

Very charming effects are attained by the use of tiles of different colors, harmoniously and artistically arranged. *Encaustic* is the trade name for decorative tiles used in such a way that there is a main ground of one color and an inserted pattern of contrasting color. Small, unglazed tiles in plain colors, combined to form a design, are called *mosaics*. White polished tiles are popular for walls and ceilings of kitchens and bathrooms; for the latter, a variety of tints are often employed.

Wall tiles were probably first made in Syria, the Tigris-Euphrates Valley, and Persia. In the latter country, wall tiles, for both exterior and interior use, were made in various centers. Several potteries in Asia Minor still produce wall tiles of traditional Persian patterns and colors, some of which are of exquisite beauty. See MOSAIC; BRICK AND BRICK-LAYING.

TILL. See DRIFT.

TILLMAN, BENJAMIN RYAN (1847-1918), an American politician, born in Edgefield County, S. C. His school days at Bethany Academy, in West Virginia, were interrupted when the War of Secession broke out, and the boy enlisted in the Confederate army. His services were soon ended, however, by a severe illness, which lasted for more than two years and left him blind in one eye. After the war, he became a planter. He soon became a Democratic leader in South Carolina and a champion of technical and industrial education. Perhaps his greatest service to the South was his founding of two technical schools, one for boys, the other for girls, the largest of their kind in the Southern states. In 1890 and 1892, he was elected governor of the state, and in 1895, 1901, 1907, and 1913, to the United States Senate. He became known throughout the country as a fiery speaker and enthusiastic fighter; his attacks on the policies of Grover Cleveland in 1895-1896 gave him the nickname "Pitchfork Ben."

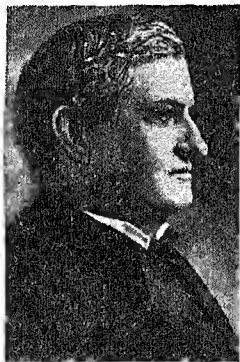


Photo: Brown Bros.

BENJAMIN R. TILLMAN

TILLY, JOHANN TZERCLAES, Count of (1559-1632), a German general who, in the Thirty Years' War, held command of the forces of the Catholic League. Destined for the priesthood, he was educated by the Jesuits, but a military life being more to his liking, he joined the Spanish army about 1574, soon rising to the command of a company, and to a provincial governorship, which he held from 1590 to 1594. Later, he joined the Austrian army in its war against the Turks.

In 1604 Tilly became general of artillery, in 1605 field marshal, and in 1610 was selected by Maximilian, Duke of Bavaria, to reorganize the forces of the Catholic League, which he later commanded in the Thirty Years' War. As commander in chief of the Catholic field forces, he won many notable victories and suffered few early defeats. On August 27, 1626, in conjunction with Wallenstein, he defeated Christian IV of Denmark at Lutter, a marked triumph for the Catholic League.

On September 17, 1631, however, Tilly was completely defeated by Gustavus Adolphus at Breitenfeld; he met the same general in a second battle at the River Lech, in April, 1632, and received a mortal wound, dying three days later. See THIRTY YEARS' WAR.

TILSIT, PEACE OF. See BONAPARTE, NAPOLEON; FREDERICK WILLIAM (III, Prussia); ALEXANDER (I, Russia).

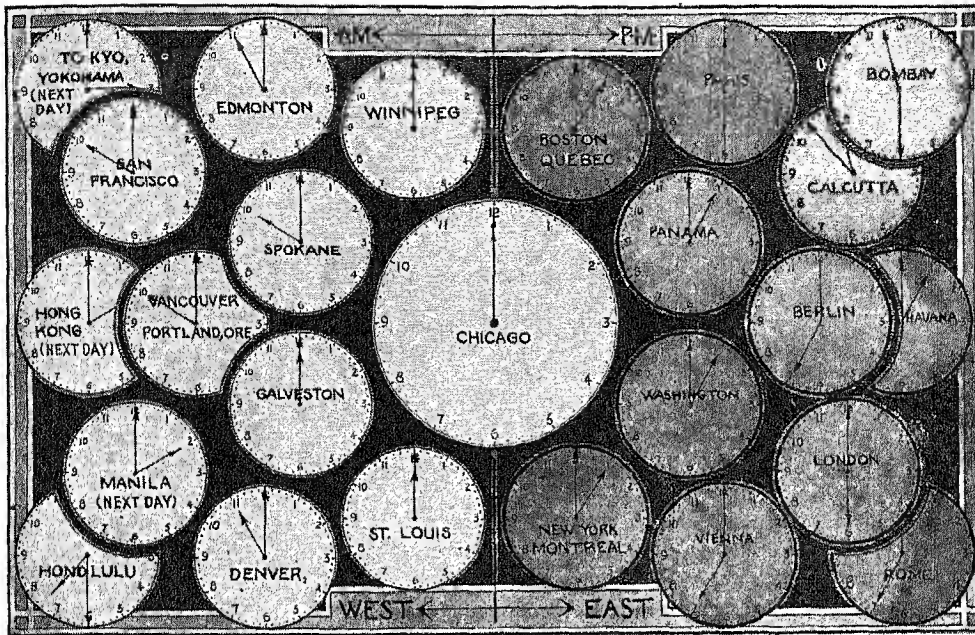
TIMAGAMI, *te mah' gah mih*, FOREST RESERVE. See ONTARIO (Forests and Lumbering).

TIMBER. See LUMBER.

TIMBREL. See TAMBOURINE.

TIMBUKTU, a town of French West Africa, situated near the southern boundary of the Sahara Desert, nine miles north of Kabara, its port on the Niger River. The terrace on which it lies is surrounded by dreary stretches of sand and marshy hollows, and the vicinity has been called "the meeting point of the camel and canoe." The site was settled in the eleventh century by the Tuaregs. Timbuktu is the trading center for merchandise brought from the north of Africa and the regions south and west of the Niger, and vast quantities of goods are exchanged here. Great caravans of 3,000 or 4,000 camels enter the town every year. The items of exchange include gums, rubber, gold, salt, wax, ivory, hardware, cheap fabrics, and beads. The local industries—cotton-weaving and the production of pottery, leather articles, and embroidery—are relatively unimportant.

When the French took possession of the town, in 1894, it was almost wholly in ruins, but under a new régime it acquired schools, European churches, modern streets, fortifications, and other innovations. It is an important Mohammedan center of learning, and contains several mosques and a Moslem library. The natives, however, live in dreary clay huts. In 1923 the surrounding territory was converted into a "Civilian Territory," with local authority. A north-and-south rail line across the Sahara is projected. In 1923 the automobile first reached the city from across the great desert, in the form of the caterpillar tractor. The population is about 6,440, but in the principal trading months, from March to June, it reaches 25,000. See FRENCH SUDAN; SAHARA.



DIFFERENCES IN SOLAR TIME AROUND THE WORLD

When it is noon in Chicago it is earlier or later west and east, as shown on the dials.

TIME. The scientist says that what we call *time* is the duration measured for all things, with a beginning and an end between an eternity past and an eternity future. A man with only the layman's viewpoint defined time in this way: "Dost thou love life? Then do not squander time, for that is the stuff life is made of." A French philosopher declares that time does not exist at all; that the past is gone and is nothing; that the future is something which may never be; and that all we have of duration is the present indivisible instant, which is gone before we can say, "It is here." The German scientist Einstein, whose name is associated with the theory of relativity, says that time cannot be considered apart from space, and that all objects exist in a world of space-time.

These theories of time are interesting, but for practical purposes, mankind is concerned with the generally accepted measurement of time. According to the common conception, any section of time is a period of duration which extends between two events, such as the death of Charlemagne and the discovery of America. For convenience, we divide such duration into smaller periods of specified length, and call them years, months, days, hours, minutes, and seconds.

The lengths of these periods, or time units, are based on certain astronomical events. The astronomer records the time between two successive transits of a star across a given *meridian* or great circle of the sky extending overhead to

the north and south; such duration is a *sidereal* day. This unit is the exact time it takes the earth to turn on its axis. During the period of a sidereal day, the earth moves forward a certain distance, varying during the year, in its orbit around the sun, and in order to face the sun again, it has to make a trifle more than one rotation on its axis. The small amount of time needed for this extra movement, about four minutes, added to the sidereal day, gives the *apparent solar* day. Averaging the lengths of the *apparent solar* days gives the *mean solar* day of twenty-four hours. For practical reckoning, the period from midnight to midnight is considered the *civil* day.

It is apparent noon in any place when the sun is crossing the meridian. Actually then, when it is noon at "Centerville," it is not yet noon at "Bordentown," ten miles west, and it is past noon a few miles east. If there were no adjustment of time reckoning, and each town had its own local, or sun, time, there would be endless confusion. In the United States and Canada, a system of *standard* time has been adopted, whereby the North American continent is divided into zones (Eastern, Central, Mountain, and Pacific), each of which takes the sun time of what is practically its central meridian. All of the clocks and watches in any one zone theoretically show the same time, at any instant. Time in the next zone east is one hour later and in the next zone west is one hour earlier.

Time corrections for the United States are made at the Naval Observatory at Washington, D. C. By means of an instrument called a photographic zenith tube, the exact moment is determined when a star crosses the meridian. Every day at noon, and at all the other hours of the day by Eastern Standard Time, signals are sent to all parts of the nation by telegraph and radio. Saint Louis gets the noon signal at 11:00 o'clock in the morning; Denver, at 10:00 o'clock; San Francisco, at 9:00. In some cities, standard time is ignored in the summer, and the clocks are set ahead one hour, in order that more hours of daylight may be utilized (see DAYLIGHT SAVING). See also the illustration on page 7179.

There is one meridian from which nearly all world time calculations are reckoned, and this basal line is the meridian which passes through Greenwich, England. When it is noon there, it is midnight exactly 180° east or west; for every 15° east or west of Greenwich, the time is one hour later or earlier. Greenwich time is also called Universal Time or U.T. F.B.I.

Related Subjects. In connection with this discussion of time, the reader should refer to the following topics in these volumes for valuable supplementary information. The articles on the various months and the days of the week may also be consulted.

Calendar	Leap Year
Christian Era	Longitude and Time
Chronology	Minute
Chronometer	Month
Clock	Nones
Day	Olympiad
Daylight Saving	Seasons
Einstein's Theory	Sidereal Time
Epoch	Standard Time
Hegira	Sundial
Hourglass	Watch
Ides	Week
International Date Line	Year

TIME, STANDARD. See STANDARD TIME.

TIME AND SPACE, CONCEPTS OF. See EINSTEIN'S THEORY OF RELATIVITY, subhead.

TIME LOCK. See LOCK (Combination and Time Locks).

TIME MEASURE, TABLE FOR. See DENOMINATE NUMBERS (Other Tables).

TIME MONEY. See MONEY (Unusual Terms Applied to Money).

TIMOTHY, a coworker with the Apostle Paul, born probably in Lystra, in Asia Minor, of a Greek father and a Jewish mother, Eunice (II Timothy 1, 5), who instructed him from childhood in Old Testament Scriptures. Doubtless converted to Christianity on the first missionary journey of Paul, Timothy joined him on his second journey, and continued to the end of the Apostle's life as his trusted associate and friend, succeeding him as overseer, or bishop, of the Church at Ephesus. He is believed to have been martyred, near the end of the first century.

The *First* and *Second Epistles to Timothy*, with the *Epistle to Titus*, are known as the

Pastoral Epistles. They contain rules for church government, the qualifications of church officers, warnings against false teaching, and counsel to faithful work and the endurance of persecution. There is serious discussion among critics as to whether these epistles are the work of Paul himself, or of some later writer. See PAUL; TITUS.

TIMOTHY, or **HERD'S GRASS**, a valuable grass widely cultivated for hay. The name *timothy* was adopted in honor of Timothy Hanson, who is said to have introduced the grass into the Carolinas, about 1720. In New York and New England, timothy is often called *herd's grass*; in England, *cat's-tail*. New York is the leading state in the production of timothy hay, and Iowa leads in the output of commercial seed. Canada, too, produces large quantities of hay and seed. This grass is the most important cultivated hay grass of North America. It is a perennial, and grows in tufts to a height of one to three feet, the slender stems bearing cylindrical spikes of minute, tightly packed florets.

Timothy is a cool-climate plant, and when grown in dry regions, it requires irrigation. It is often planted with clover, though the two do not mature at the same time. Farmers in both the United States and Canada frequently sow timothy seed in a crop rotation with oats and other grains. Since timothy does not endure long under continued grazing, it is not usually considered a satisfactory pasture grass, unless mixed with hardier grasses. It is relished by stock generally, but is especially suitable for horses. See CLOVER; HAY. B.M.D.

Classification. Timothy belongs to the grass family, *Gramineae*. Its botanical name is *Phleum pratense*.

TIMPANOGOS, *tim pah no' gos*, CAVE. See MONUMENTS, NATIONAL.

TIMUR, *te moor'*, more generally known as TAMERLANE (1336-1405), a renowned Oriental conqueror, was born at Kesh, near Samarkand, in Central Asia. From his father, Teragai, head of a tribe, but a man of retiring and studious disposition, he gained a love for reading and a reputation for a knowledge of the Koran. Soon after his twenty-first year, he appeared as a leader of armies, and when Turkestan was subjugated by the Kalmucks under Tughlak, Tamerlane was made governor of Kesh by Tughlak. For some years after the Kalmucks were expelled, he reigned jointly over the country with his brother-in-law, Hosain. He defeated the latter in battle in 1369, and became the sole sovereign, with his throne established at Samarkand. For thirty years, he suppressed foes within his own territory and carried on conquests among the Mongols (which see), as far as the Volga and the Ural rivers, and among the Persians, including principally

MAN'S MEASUREMENT OF TIME

Early mankind
bounded a period
of time by movement
of shadows

The sundial
One form of sundial
was used 700 B.C.

American Indians
computed time by "moons"

The sandglass out of
which grew the
hourglass, dates from
the third century B.C.

The
Egyptians
used the
obelisk as
a sundial

The water clock, or
clepsydra, Egyptian about
140 B.C.

Early watches were
ornate and thick

Modern wrist watch
with strap

Grandfather's clock.
Spring motor or weight

Modern watch cases
are simple and thin

Electrically operated
clock regulated hourly



the possessions of Baghdad and Kurdistan. Wherever he went, there followed death and desolation.

In 1398 he invaded India, and years of bloodshed and devastation followed, as a part of India's gloomy history during this period. Tamerlane's capture of the city of Delhi included an immense amount of spoils and the deliberate murder of over 100,000 men. Naturally, the conqueror's triumphal return to Samarkand was attended with great pomp. Following this came a successful attack on the Turks and the Egyptians, including the capture of Damascus and Aleppo. The restless old warrior finally undertook an invasion of China, but he died of fever and ague in his encampment. His conquests covered the territory from the Persian Gulf to the Volga, and from the Hellespont to the Ganges.

In literature, he has become known through Marlowe's drama *Tamburlaine the Great*. It is generally granted that Timur possessed ability and insight as a statesman and administrator, as well as military genius. He was also a patron of science, letters, and art.

Origin of Name. The name *Tamerlane* appears to be a corruption of *Timur-i-leng*, or Timur the Lame.

TIN, a lustrous white metal, used more than any other material for kitchen utensils and for containers in the canning industry. Though called one of the inferior metals, it adds much to the comfort of daily living, and would be greatly missed if the supply should ever fail. Tin is a chemical element, with the symbol *Sn* (from *stannum*, the Latin name for the metal). It has been in use for at least 10,000 years, and was mined by the ancients in both Spain and Britain. We know that tin was imported by the Phoenicians from Cornwall as early as the fifth century B.C.

Properties and Uses. Tin is a soft, fairly light metal with a low melting point. Only lead among the metals possesses less ductility, that is, the power of being drawn into a wire when heated; but tin is one of the most malleable metals, and can be rolled into the very thin sheets we know as *tinfoil* (which see). As a wrapping to keep out moisture, and as a material for collapsible tubes, tinfoil is known in every home.

The tinware found in the kitchen is made of *tin plate*, which is very thin sheet iron or sheet steel, coated or plated with tin. Tin alone is easily bent, and the iron or steel sheets provide strength; the tin, on the other hand, adds color and luster and prevents rust in the other metal. Tin plate, too, is less expensive than pure tin. Since tin is not affected by ordinary atmospheric conditions, nor by weak acids found in food, it is a most serviceable material for coating containers used in canning foods. Tin plate

or *terne-plate* (an iron sheet coated with lead-in alloy) is largely used for roofing. Cheap mirrors sometimes are coated with an amalgam of tin and mercury, or with tinfoil. Soft solders are alloys of tin and lead; Babbitt metal, an anti-friction alloy used for bearings, is a combination of tin, copper, and antimony; and tin and copper are mixed to make bronze, a metal harder than pure copper and tougher than pure tin. Tin and chlorine were formerly used in weighting silks. Tin is an essential war material. It is used in motor bearings for trucks, tanks, and airplanes, in tracer bullets, shells, torpedoes, flares, cannons, and smoke-screen apparatus. To meet national defense needs in 1940-1942 half nickel and half tin were used in coating iron plate. See MINERALS AND MINERALOGY.

Occurrence. Very little tin is found in the United States. The world production in average years is about 200,000 tons. British Malaya, Bolivia, and the Netherlands Indies are the world's largest producers. Others are Thailand, China, Nigeria, Belgian Congo, Burma, Australia, England, and South Africa.

Preparation for Use. The metal, after leaving the mines, undergoes five important processes before it is a commercial product. The ore contains arsenic and sulphur, and this material is burned out in a furnace or in a roasting machine. If copper sulphide is present, as is often the case, it is converted into copper sulphate by this first process, and is drawn off by leaching. Next, the ore is smelted in a reverberatory furnace; it is heated for about six hours, after which the slag is removed, and then it is heated again for a similar period. The tin, in heated, liquid form, sinks to the bottom of the container, and is drawn off and run into molds to cool.

Since it must be purified to a yet greater extent, the ingots, as the cooled bars are called, are again placed in the reverberatory furnace and heated; the pure tin melts at reasonably low temperature (455° F.), and is run into a container, leaving the final impurities behind. It is then stirred until all gases escape, after which it is cooled. In the process of cooling, the purest tin, being lightest, rises to the top of the mass, the more inferior quality being in the center, while the lower layer is so impure that it must again be put through the purifying process. The pure tin ingots are sent to the rolling mill to be pressed into sheets. T.B.J.

Related Subjects. The reader is referred in these volumes to the following articles:

Alloy	Bronze	Malleability
Babbitt Metal	Ductility	Solders

TINCAL, an impure variety of borax (which see).

TINFOIL, a very thin sheet tin, often alloyed with lead, used for wrapping small articles, such as photographic films, chocolate, or tobacco,

when a moisture-proof covering is required. Formerly, it was made by hammering and polishing white tin, but the modern method is to run the bars of tin through a series of rollers, which press the metal into thin sheets. To keep these brittle metallic strips from breaking apart, after a few rollings they are heated and allowed to cool slowly before the rolling process is continued. A special tinfoil, containing a little copper, is sometimes used for mirror backs. See TIN. T.B.J.

TINTORETTO, teen toh ret' toh (1518-1594), a celebrated master of the Venetian Renaissance, one of the world's greatest painters. His real name was JACOPO ROBUSTI; he was called Tintoretto (meaning *little dyer*) because of the fact that his father was a dyer by trade. The elder Robusti, impressed by his son's attempts to decorate the walls of his shop, took him to Titian, then in the height of his fame, and the latter became the boy's instructor. For some reason, Tintoretto did not remain long in Titian's studio, and the two never were close friends. At the same time, the younger artist appreciated the master's genius, and patterned after him in use of color. His motto was—"The drawing of Michelangelo and the coloring of Titian."

Tintoretto pursued a severe course of study independently, and by the time he had reached the age of twenty-eight, he was painting some of his greatest religious works. Among these was a *Last Judgment*, made for the Church of the Madonna dell' Orto. In 1548 he began work on four pictures for the guild house of San Marco, a group which includes the celebrated *Miracle of Saint Mark*. This picture, which the French critic Taine called Italy's greatest painting, is now one of the treasures

of the Venetian Academy. It is especially admired for its dramatic action, a quality which Tintoretto was highly successful in expressing. In 1560 he began a new labor—the decoration of the Ducal Palace in Venice—and about the same time commenced work on the adornment of the walls and ceiling of the guild house of San Rocco. For this edifice he painted one of

his masterpieces, the magnificent *Crucifixion*. The ceiling of the great hall he adorned with the *Plague of Serpents*, *Paschal Feast*, and *Moses Striking the Rock*.

In 1577 the guild commissioned him to paint for the hall and adjoining church three pictures a year, and the two structures to-day constitute a museum of his works, for he faithfully performed this task until his death. The culmination of his activity, however, was the completion of a colossal *Paradise*, covering an entire wall of the Hall of the Grand Council, in the Ducal Palace. This wonderful canvas, the largest oil painting in the world, is 74 feet long and 30 feet high, and contains over 400 life-size figures. Unfortunately, its original splendor has been dimmed



"CHRIST WITH MARY AND MARTHA"

An example of the art of Tintoretto.

by neglect and unskilful attempts to retouch it.

Summary. In the art of Tintoretto we see the combination of a number of tendencies of the Renaissance. He was probably the equal of Titian as a portraitist, and in some respects the latter's equal as a colorist. His imaginative powers were remarkable, and in his ability to express dramatic action, he ranks second only to Michelangelo. Hundreds of his works are preserved in the galleries of Europe, and America also possesses a few examples. Among these are the *Doge in Prayer before the Redeemer* and *Miracle of the Loaves and Fishes*, in the Metropolitan Museum, New York; and a *Senator*, in the Gardner Collection, Boston. In Munich is the painting *Christ with Mary and Martha*.

Another Estimate. The foregoing is the generally accepted estimate of Tintoretto, but there is a modern school of criticism which declares that his contribution to art has been greatly overrated, and that in much of his work his treatment of his subjects is coarse, rather than truly imaginative, his drawing careless, and his color violent. This school, however, credits him with a few paintings of real genius, notably his *Miracle of Saint Mark*, his *Saint Jerome* and *Saint Andrew*, *Ariadne*, *Pallas Driving Away Mars*, and *Saint George*.

TIPPECANOE, BATTLE OF. See WAR OF 1812 (Story of the War).

"TIPPECANOE AND TYLER TOO." See HARRISON, WILLIAM HENRY.

TIP-TOP HILL, highest point in Ontario. See ONTARIO (Surface and Drainage).

TIRACH MIR, *te' ruch meer*, highest peak in the Hindu Kush range. See HINDU KUSH.

TIRANA, *te rah' nah*, the capital of Albania (which see).

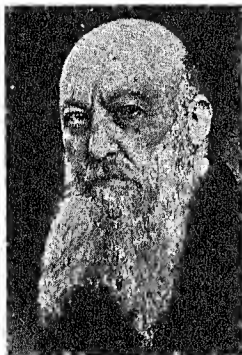
"TIRED" SEA, a name sometimes applied to the Mediterranean Sea (which see).

TIRES, AUTOMOBILE. See AUTOMOBILE; PNEUMATIC TIRES.

TIRO, MARCUS TULLIUS. See SHORTHAND (Historical).

TIROL, a variant of Tyrol (which see).

TIRPITZ, ALFRED VON (1849-1930), a statesman and chief naval officer under the late German Empire. He was the first man trained as a sailor ever made Secretary of State for Naval Affairs, a position which he held for nineteen years, following his appointment in 1897. His activities in building up the German navy, under direction of Emperor William II, which was in some degree responsible for the World War, are recounted in his autobiography, *My Memories*, published in 1919.



VON TIRPITZ

Tirpitz entered the German navy as a cadet in 1865, and reached the rank of post captain in 1880. In 1892 he was made chief of staff of the supreme naval command. Promotions followed at intervals, and in 1911 he reached the rank of grand admiral. In 1908 he became a life member of the Bundesrat, the upper house of the Imperial Parliament. In March, 1916, for political reasons, he resigned all his offices. Following the German revolution in 1918, animosity against Tirpitz resulted in his flight to Switzerland, but he returned to Berlin in 1921, and entered the Reichstag as a German National Deputy. He favored the Dawes Plan, but opposed the Locarno Pact.

TISSIPHONE, *tih si' o ne*, one of the three Furies (which see), attendants of Proserpina, the goddess of death.

TISSAPHERNES, *tis ah fur' neez*. See ALCIBIADES; XENOPHON.

TISSOT, te so', JAMES JOSEPH JACQUES (1836-1902), a French artist, born in Nantes, whose fame rests chiefly on a series of water-color paintings depicting the life of Christ. The collection, which consists of 350 studies, is in the possession of the Brooklyn Institute Museum. To obtain material for this labor, Tissot spent ten years in the Holy Land, and he painted with painstaking attention to detail and with extraordinary realism. At the time of his death, he was working on a similar series illustrating Old Testament stories. In all, his Biblical pictures number nearly 700. It is a curious fact that, during the first part of Tissot's career, he depicted the worldly and sensual aspects of life in Paris, and it is supposed that his decision to paint religious scenes was the result of a spiritual change within him, as the result of bereavement.

Tissot fought in the Franco-German War, and, becoming interested in the Commune, was compelled to leave France for England, where he spent twelve years, drawing caricatures for *Vanity Fair* and painting portraits. Then, after returning to Paris for a while, he went to Palestine.

Other Works. His earlier pictures are represented by the series *La Femme à Paris* ("The Parisian Woman"). A well-known *Faust and Marguerite* was purchased by the government for the Luxembourg Gallery.

TISSUE, *tish' u*, is defined in physiology as an organization of cells grouped together for the purpose of doing a special work. There are five fundamental types of tissue—epithelial, muscular, connective or supporting, nervous, and vascular. *Epithelial* tissue is that which covers the exterior of the body, lines the cavities connecting with the surface, and forms the glands and the brain—"noblest elements of the body." *Muscular* tissue is made up of a group of cells whose chief property is that of contractility. *Connective* tissue includes groups of cells whose functions are to bind various parts of the body together, and to serve as support for various parts. The chief types of connective tissue are fibrous, elastic, loose fibro-elastic, adipose, cartilage, and bone. *Nervous* tissue is the name given to the particular types of cells that are grouped together to perform the function of conveying nervous impulses. *Vascular* tissue includes lymph and blood, which are fluids containing groups of cells whose function is to carry nourishment and waste products to their proper places in the body. K.A.E.

Related Subjects. For a detailed discussion of these various tissues, consult in these volumes the following articles:

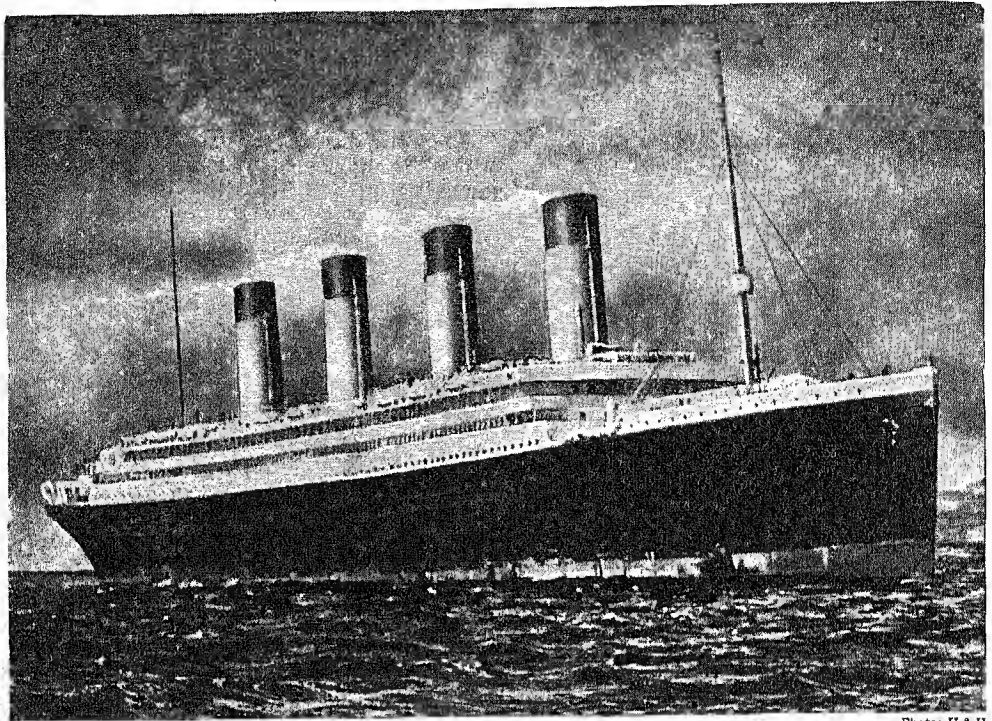


Photo: U & U

THE "TITANIC"

Bone
Cartilage
Cell
Joints
Ligament

Membranes
Muscles
Nervous System
Skin
Tendons

TISSUE JUICE. See CARREL, ALEXIS.

TISZA, te' zah, RIVER. See HUNGARY (Physical Features).

TITAN, ti' tan, satellite of Saturn (which see).

TITANIC, THE, a steamship of the White Star Line, which collided at full speed with an iceberg, on its first trip from Liverpool to New York, and sank within a little over two hours. The disaster occurred at 2:20 A.M. on April 15, 1912, when the steamer was about 1,600 miles northeast of New York. By means of lifeboats and rafts, 706 persons were saved, and were rescued later by the *Carpathia*, which had received the wireless calls broadcast for help; but all the remainder of the 2,223 passengers and members of the crew on board, a total of 1,517, perished. At the time it was launched, the *Titanic* was the largest ship afloat, but others of greater dimensions (see SHIP) have since been built. Its length was 852.5 feet; beam, 92.5 feet; depth, 73 feet 3 inches; gross tonnage, 46,328. Its speed was twenty-one knots (about twenty-four miles per hour). Many notable persons perished, and there were splendid examples of self-sacrifice among the

shipwrecked passengers. See, in this connection, CHARACTER TRAINING (Unselfishness Is Fundamental).

TITANIUM, ti ta' nih um, a rare metallic element which imparts toughness and hardness to steel and luster to silver, and increases the brightness of the flame of an arc lamp when combined with the carbon. It is therefore used in the manufacture of filaments for such lamps. Its salts are used in dyeing. Titanium was discovered in 1789. It is not found native, but when prepared artificially is a greenish-gray powder with a bright, metallic luster. It possesses to a remarkable degree the power of combining with nitrogen at a high temperature. Metals in which it occurs are said to be *titaniferous*. Though nowhere found abundantly, it is widely distributed, and occurs in many iron ores. It is also one of the elements known to be in the sun. In the United States, it is obtained in commercial quantities from rutile (which see). Its symbol is *Ti* [see CHEMISTRY (The Elements)].

T.B.J.

TITANS, ti' tanz, in Greek mythology, the giant sons and daughters of Uranus (Heaven) and Terra, or Gaea (Earth). Six of them were men, and six were women. The latter were called the Titanides. So strong were the Titans that Uranus greatly feared them; and threw them from Olympus down into a dark cavern in the earth, called Tartarus, where he chained

them fast. Terra grieved over the loss of her children, and urged her husband to set them free; but whenever he heard their angry roars, he renewed his determination to keep them where they were.

Finally Terra grew very angry, and herself descended into Tartarus, where she urged the Titans to revenge themselves upon their father; but all refused to undertake the heavy task except Saturn, the youngest. Terra gave him a magic scythe, released him from his chains, and bade him set forth against his father. Meeting the latter unawares, Saturn defeated him by means of the wonderful scythe, and wounded him severely. So angry was Uranus that he cursed his son and prophesied that some day he, too, would be overthrown by his own child. Saturn released his brothers and sisters, all of whom agreed that he should be ruler over them. He selected Rhea for his wife, and assigned to each of the others some portion of the earth. Later, Jupiter overthrew Saturn, and those Titans who did not submit willingly to his rule were again confined in Tartarus (which see). See, also, RHEA; SATURN.

TITHES, from the Anglo-Saxon *teotha*, meaning *a tenth part*, usually refers to a tax of one-tenth of the profit, or of the produce, derived from the use of land. Moses established the custom of tithes in levying upon the Jews a tax of one-tenth of their possessions or profits, to support the priests. The custom of exacting tithes was almost universal in the ancient world. The Roman Catholic Church, in the sixth century, arranged for payment of tithes for the support of the Church; later, several European countries established the custom, to help pay expenses of royalty.

In England, as early as 786, tithes were exacted for all lands except those belonging to the Church and the Crown, payable in services or profit in kind. Under the present Tithe Acts of England, a tithe rent charge, so called, has been substituted for tithes, and is payable for parish support. The acts do not apply to the City of London, where the rate of tithes has long been fixed by special statutes and local acts. The rate is a percentage of the rent of houses, shops, and the like. In the time of Henry VIII, the rate was fixed at two shillings nine pence in the pound, or about fourteen per cent of the rent.

By an old law in Quebec, the Roman Catholic Church is supported by tithes.

In the United States, no tax of this kind is levied, except by the Mormon Church, in which the law is based upon the old Jewish custom. Many Christian people of all denominations make it a rule to give one-tenth of their incomes to the cause of religion and charity.

TITHONUS, *tih tho' nus*, one of the lovers of Aurora (Eos), goddess of the dawn. See AURORA.

TITIAN, *tish' an* (1477-1576), universally renowned as one of the world's masters of color, was the most eminent artist of the Venetian school of painting during the Renaissance. His real name was TIZIANO VECELLIO; Titian is a variation of Tiziano.

Critics do not hesitate to give him a place among the foremost painters of all time. Of him it has been said, "He is a painter who by



TITIAN

wondrous magic of genius and of art satisfies the eye." It was not his purpose to express through his canvases intellectual ideas, but he aimed to make his works splendid in their pictorial effect, and in this respect he was supremely successful. Titian began his art studies in Venice in his boyhood, and was a pupil of Giovanni Bellini (which see). Among his fellow pupils, who influenced his early work, were Giorgione (which see) and Palma Vecchio. He began to work along independent lines about the year 1513. During this second, or formative, period, which lasted until 1530, he produced several great altarpieces, including the celebrated *Assumption of the Virgin*, which is now in the Venetian Academy (for description, see ASSUMPTION). This is ranked as one of the twelve greatest paintings (see PAINTING). Among other well-known canvases of this period are the *Pesaro Madonna*, in the church of the Frari, Venice; *Holy Family*, in the Louvre; *Bacchus and Ariadne*, National Gallery, London; and a *Flora*, in the Uffizi, Florence.

By 1530 Titian's fame was firmly established, and he had attained a sure grasp of his art. Life for him was thereafter a succession of



The Art of Titian. Above, Mary with Infant, and at the right, the donor of the picture. [Donors of religious pictures often had their portraits painted in with the Holy Family; thus they required no "press agent."] Below, "Bacchus Finds Ariadne."

triumphs, and princes, dukes, cardinals, kings, Pope Paul III, and even the great Emperor Charles V were among his patrons. In 1532 the emperor commissioned him to paint his portrait, and so pleased was he with the completed canvas that he made the artist court painter and named him Knight of the Golden Spur and Count Palatine. There are several other Titian portraits of Charles V in existence, notably an equestrian portrait of the emperor in full armor (Madrid). The artist also executed a number of portraits of the emperor's son, Philip II of Spain, and he portrayed Pope Paul III, the Duke of Saxony, the Duke of Urbino and his wife, and other persons of high position. The picture of the wife of the Duke of Urbino, Eleanora Gonzaga, now in the Uffizi, is one of the most celebrated of his female portraits. Probably his own daughter, Lavinia, was his favorite subject.

Religious and mythological paintings, too numerous to treat comprehensively, were also produced in this fruitful period of a long career. Representative of these are *Christ at Emmaus*, in the Louvre; *Madonna with Saint John and Catharine*, in the National Gallery, London; *Venus and Cupid*, in the Borghese Gallery, Rome; *Jupiter and Antiope*, in the Louvre; and *Rape of Europa*, in the Gardner Collection, Boston. Something, too, should be said of Titian's treatment of landscape. Though he used scenery merely as a background, or as a setting for his figures, he pictured landscape scenes with great charm, and his work in this field has a definite place in the history of art.

Titian was born in Cadore, in the Alps region, and these mountains and the Venetian lagoons appear again and again in his canvases. He died of the plague in the hundredth year of his life, and was buried in Venice in the church of the Friari.

TITIAN, THE AMERICAN. See ALLSTON, WASHINGTON.

TITICACA, *te te kah' kah*, a picturesque lake in South America, the largest on the continent, forming part of the boundary between Peru and Bolivia. It is situated in the center of a lofty valley surrounded by mountains, and its surface, which is dotted with islands, is about 12,500 feet above sea level. The lake is about 130 miles long, 30 miles wide, and it is 2,664 square miles in area. In some parts it is 700 feet deep, but there are many shallow places, and numerous reed marshes occur along its shores. It is fed by numerous streams, and discharges through the Desaguadero River, at its southern extremity, into Lake Aullagas. A fleet of steamers navigates Lake Titicaca, supplementing railway connections between Peru and Bolivia. The region contains many interesting archaeological remains, including some that antedate the Incas. See BOLIVIA (The Land and Its Rivers).

TITLARK. See PIPIT; LARK.

TITLE, a word derived from the Latin *titulus*, meaning *an inscription, label, sign, or token*, has several distinct meanings. As an inscription, it is the descriptive designation which is used as the name of a book or to give some idea of its contents. The term was easily extended to the descriptive heading of written or printed documents, such as deeds, and bills introduced in Congress or Parliament. The various documents, including deeds, which form the evidence of ownership of property, are called *title deeds*, and from this term came the common use of the word title as the "union of all the elements which constitute legal ownership."

Title as Ownership. The elements which give title to property, or constitute ownership, are two—possession and the right of possession. The familiar saying that "possession is nine points of the law" is merely the popular expression of the rule in law that possession is *prima facie* evidence of ownership. But possession is not sufficient if the title is disputed; the right of possession must be proved. In the case of personal property, possession is better evidence of ownership than in the case of real estate, for the title to the latter is usually recorded, either by deed or by some method resembling the Torrens system. An exception to the rule that possession is evidence of ownership is seen in the case of ships, title in which can be ascertained from the register.

Title to personal property may be acquired in several ways. *Original acquisition* is the technical term applied when an inventor, author, or musician holds the ownership in something he has created, or when a man takes for his own use something which belongs to no one else, such as wild animals. Title may also be acquired by gift, contract, or sale, these transfers all being known as *transfers by act of the parties*. A third method is by act of law; for example, in bankruptcy, judgment, intestacy, or marriage.

Ownership of land may be acquired either by *descent* or by *purchase*. These are purely legal terms, and are not used in their popular sense, the second class including "every mode of acquisition of an estate except that by which an heir, on the death of his ancestor, becomes owner by operation of law." Acquisition by descent, therefore, is restricted to a transfer by legal succession or following the death of an owner intestate.

Related Subjects. The reader is referred in these volumes to the following articles:

Copyright	Patent	Torrens System
Deed	Titles of Honor	Trade-Mark

TITLE, ABSTRACT OF. See ABSTRACT (Abstract of Title).

TITLES IN LETTER WRITING. See LETTER WRITING (Use of Titles).

TITLES OF HONOR. Phrases or words applied to the names of individuals or used in addressing them, as a mark of distinction, are known as titles of honor. In its widest sense, the expression refers to all titles, whether official or honorary, military, naval, civil, or ecclesiastical. A narrower definition would exclude those titles which are used as a mark of the bearer's office or profession, and include only those which indicate preëminence, or awards for distinction. Thus, *doctor* or *professor* would not be considered a title if the bearer were a physician or a teacher, but if he had been given an honorary degree from a university, it would be an honorary title. This narrower sense is covered in this article; for titles in the wider sense, see ADDRESS, FORMS OF.

The Federal Constitution forbids any officer or employee of the United States to accept a title from any foreign power, without the consent of Congress; and, under the naturalization laws, any foreigner who holds a hereditary title or title of nobility must renounce it if he becomes a naturalized citizen. In Europe, however, titles are found on every hand. In Great Britain are the five orders of nobility, distinguished by the titles duke, marquis, earl, viscount, and baron; the title of baronet, which is accompanied by the hereditary right to use the prefix Sir, and knighthood, with the same right, but not hereditary, are also purely honorary. The common forms of address, *mister* (master) in English, *monsieur* (literally, "my lord") in French, and *herr*, in German, were once honorary titles, and did not become common to all men until after the French Revolution.

Honorary titles, so far as they are still used in Europe, are survivals of feudalism. They were originally applied to any individual as a mark of honor, but as the fields of feudal days became hereditary, the titles, too, descended from generation to generation. Titles were used by the ancient Greeks and the Romans, and especially by the Romans of the Byzantine Empire. "Most high," "most mighty," "most sacred," "all-highest majesty," are, or have been, royal titles or forms of address. The title *caesar*, from which *czar* and *kaiser* are derived, was originally a nickname meaning "long-haired" or "hairy"; from the fact that it was the surname of the great Roman empire-builder, Julius Caesar, it came to have a new meaning; and in later days, all Roman emperors bore the dignified title of caesar. The first German emperor is called Charlemagne, or "Karl the Great," but *karl* originally meant merely *man* or *fellow*, and survives to-day in the English *churl* and the German *kerl*. Yet the Slavs, who knew the power of Charlemagne to their sorrow, have made his name the equivalent of king (*kral* or *korol*). These are perhaps extreme examples, but most titles, in fact, quickly became set phrases, without any of

their original significance. Thus, dukes are no longer leaders (Latin *dux*); counts are no longer companions (*comites*) of the emperors; and constables have not for centuries been counts of the stable (*comes stabuli* in the former Byzantine Empire). Constable later was applied to the commander in chief of the army, and judiciary officers.

Related Subjects. For additional details consult:

Address, Forms of	Marquis
Baron	Nobility
Czar	President
Duke	Prince
Earl	Prince of Wales
Emperor	Queen
Heraldry	Rajah
Kaiser	Rank in Army and Navy
King	Sultan

TITMOUSE, TIT, OR TOMTIT, names of various small, hardy birds, with long, soft plumage, found nearly all over the world. They belong to the same family as the nuthatches. The titmouse eats whatever food is

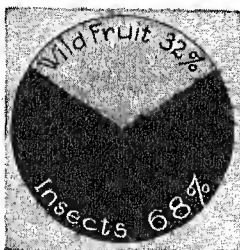


Photo: Visual Education Service

TUFTED TITMOUSE

to be had, but is especially valuable for destroying millions of insects' eggs and larvae. The most common North American species is the *black-capped chickadee*, a gray and black bird a little over five inches long, which usually keeps to the woods in summer but ranges familiarly around dwellings in search of food in winter, fearlessly answering to an imitation of its call "chick-a-dee-dee-dee," and even taking food from the hand if coaxed. It ranges in Northern United States and in Canada east of the Great Plains, and south to the Carolinas. The chickadee nests in hollow trees or stumps, the eggs being five to ten in number and white

in color, marked sparingly with reddish-brown. This friendly bird has been declared the state bird of Maine, by act of the legislature. In the Southeastern states is found the *tufted titmouse*, somewhat larger than the chickadee, and having a high crest. Its loud call, "peto, peto, peto, peto," is repeated monotonously for hours at a time. The *bush tits* are tiny birds that build a bulky nest, purse-shaped and often a foot in length, which they enter through a circular opening at one side or near the top.



FOOD OF THE BLACK-CAPPED CHICKADEE

Some Old World species of titmice are the *great titmouse*, olive-green in color, with black head and breast, common throughout Europe; the *Japanese titmouse*, a similar bird of Eastern Asia; and *blue titmice*, which include several handsome species of Europe and Africa. D.L.

Scientific Names. Titmice belong to the family *Paridae*. The black-capped chickadee is *Parus atricapillus*; the tufted titmouse is *Parus bicolor*. Bush tits belong to the genus *Psittiparus*.

TITO SCHIPA. See SCHIPA, TITO.

TITUS (A.D. 40-81), a Roman emperor, the eldest son of Vespasian. He was brought up at the court of Nero and served as tribune in

Britain and Germany, as well as in Judea. Titus came into prominence in A.D. 70, during the reign of his father, by capturing Jerusalem, after a protracted siege. On his return to Rome, Titus was received with imperial



Photo: Visual Educational Service

TITUS

The coin of his reign shows the ruler's head in profile.



honors, and shortly afterward became a colleague of the emperor. In A.D. 79, on the death of Vespasian, he became sole ruler. He was a man of kindly impulses, and endeared himself to his subjects by his generosity to the sufferers in the eruption of Mount Vesuvius, A.D. 79, and to those who were affected by a destructive

fire and a pestilence which devastated Rome in the following year. The people called him "the Friend and the Delight of Mankind." Titus is renowned in history as a builder. He completed the great Colosseum, which had been begun by his father (see *COLOSSEUM*), built a set of magnificent baths, and restored many ancient buildings then falling into ruin. He died in the third year of his reign.

Arch of Titus, a Roman arch of triumph built by the Emperor Domitian in the year 81, to commemorate the capture of Jerusalem by Titus. It stands on the Sacred Way, facing the Forum, and was rebuilt in 1822. The inner side of the arch is decorated with reliefs depicting the exploits of Titus, and showing spoils taken from the Temple. See next page.

TITUS, a devoted associate of the Apostle Paul, and, so far as is known, the first Christian missionary of purely Greek birth. Some modern critics believe that he was a brother of Luke. He was brought by the Apostle, probably from Antioch, to the council held at Jerusalem to consider how far Gentile converts should be required to conform to Jewish rites, and was excused from circumcision by the decision of that body. He was regarded by Paul with great affection, and accompanied the latter on many of his journeys, succeeding him as overseer, or bishop, of the churches of Crete, after Paul's death.

The *Epistle to Titus* is of the same authorship and general contents as the *Epistle to Timothy*. See PAUL; TIMOTHY.

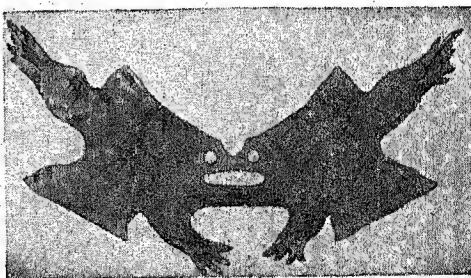
TIW, OR TYR, Norse god of war. See TUESDAY.

TLEMÇEN, *ilem sen'*, a city in Algeria (which see).

TLINGITS, OR TLINKITS. See ALASKA (The People).

T.N.T. See EXPLOSIVES.

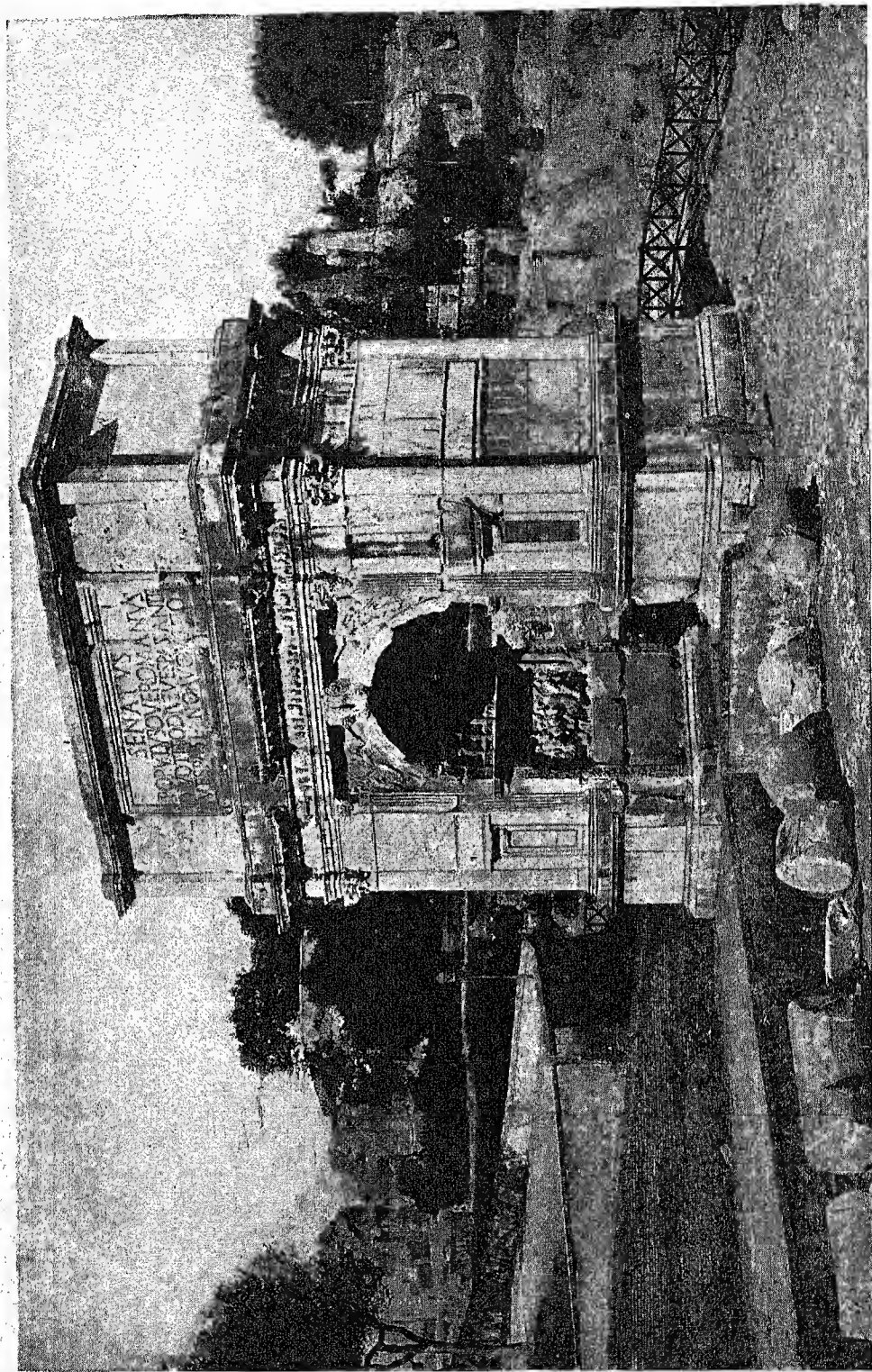
TOAD, *tohd*, a cold-blooded animal resembling the frog. The toad makes its home in shady places in fields and gardens, and as one



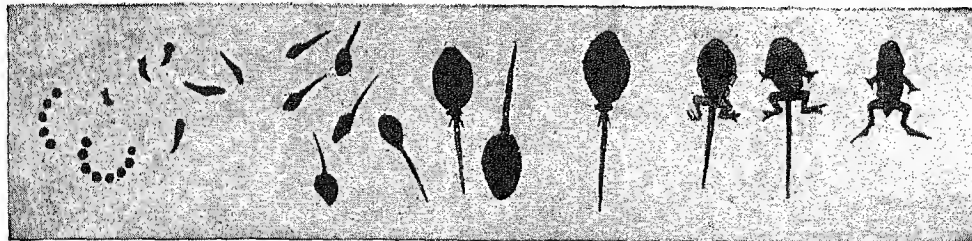
SKIN OF THE TOAD

It is shed in one piece.

of the greediest eaters of grubs and insects, it is a valuable ally of the farmer and the gardener. Toads and frogs are tailless amphibians. The body of the common toad is stouter than



The Arch of Titus. Erected in honor of his sack of Jerusalem, in A.D. 70. The processional group beneath the arch represents bearers carrying the seven-branched candelstick taken from the Temple. Between this arch and the Colosseum the ancient pavement of the Sacred Way still remains. See Rome (Ancient).



FROM TADPOLE TO YOUNG TOAD IN SIXTY DAYS

that of the familiar kinds of frogs, and its movements are more clumsy. Frogs, in general, have a smoother skin and live mostly in water; most toads have a warty skin, and spend most of their lives on land. The toad's rough skin is the color of the ground, which helps to make it inconspicuous to its foes. Toads have no teeth in the upper jaw, as have the common frogs. The shoulder glands and the warts in the skin secrete a milky poison which serves as a defense. It affects violently the mucous membrane of the mouth or eyes, and is fatal if injected into the blood. It does not cause warts, and has little or no effect upon the human skin. With patience and tactful feeding, a toad may be tamed, but it must never be picked up or handled, for it will then become frightened and hop away.

Although "ugly and venomous," the toad "wears yet a precious jewel in his head." In these words Shakespeare described the animal's glittering, golden eyes, which, when open, protrude prominently. They are provided with lids which rise from below, like those of birds. When the toad is asleep, the eyes are drawn in and lie even with the surface of the head. The toad has no ribs to aid in inflating the lungs, and is obliged to swallow the air instead. Another curious thing about this animal is the way in which it "drinks," not through its mouth, but by absorbing the water through its skin. See illustration (Life History), page 4831.

Toads sleep through the winter in burrows in the ground, emerging in the early spring. They migrate to the nearest pond, where they lay their eggs. These are about the size of a pinhead, and are bound together in long strands by a transparent, jelly-like substance. The small, flat tadpole is hatched in from two to four days, and attains adult size in about two months. The outer skin of a toad is molted several times a year, and on each occasion it is swallowed.

It is not likely that toads will ever become too numerous, for they have many natural enemies. The tadpoles are the prey of newts, water beetles, and fish, and the toads are eaten by snakes, hawks, crows, and owls.

The toad genus (*Bufo*) is represented in every part of the world except Australasia and Madagascar. There are about 100 species in all.

Economic Value. At night, the toad leaves its hiding place under leaves or stones and ventures forth in search of food. It will eat only live grubs and insects, which it snatches up with its sticky tongue and horny, toothless jaws, and swallows whole. To employ it in a



THE TOAD'S TONGUE

Showing the movement of the tongue in catching an insect. This organ is fastened in front instead of at the back, and can be extended fully two inches in an exceedingly rapid movement. Its surface is sticky.

and ventures forth in search of food. It will eat only live grubs and insects, which it snatches up with its sticky tongue and horny, toothless jaws, and swallows whole. To employ it in a



Photo: Saint Clair

AN EXAMPLE OF PROTECTIVE COLORATION

The toad resembles the stones in form, color, and even in surface appearance. See PROTECTIVE COLORATION.

professional capacity as an exterminator of insects is a new solution for the bug problem. It is estimated that a toad is worth five dollars a year to the farmer for the destruction of cutworms alone. It will also devour 100 rose

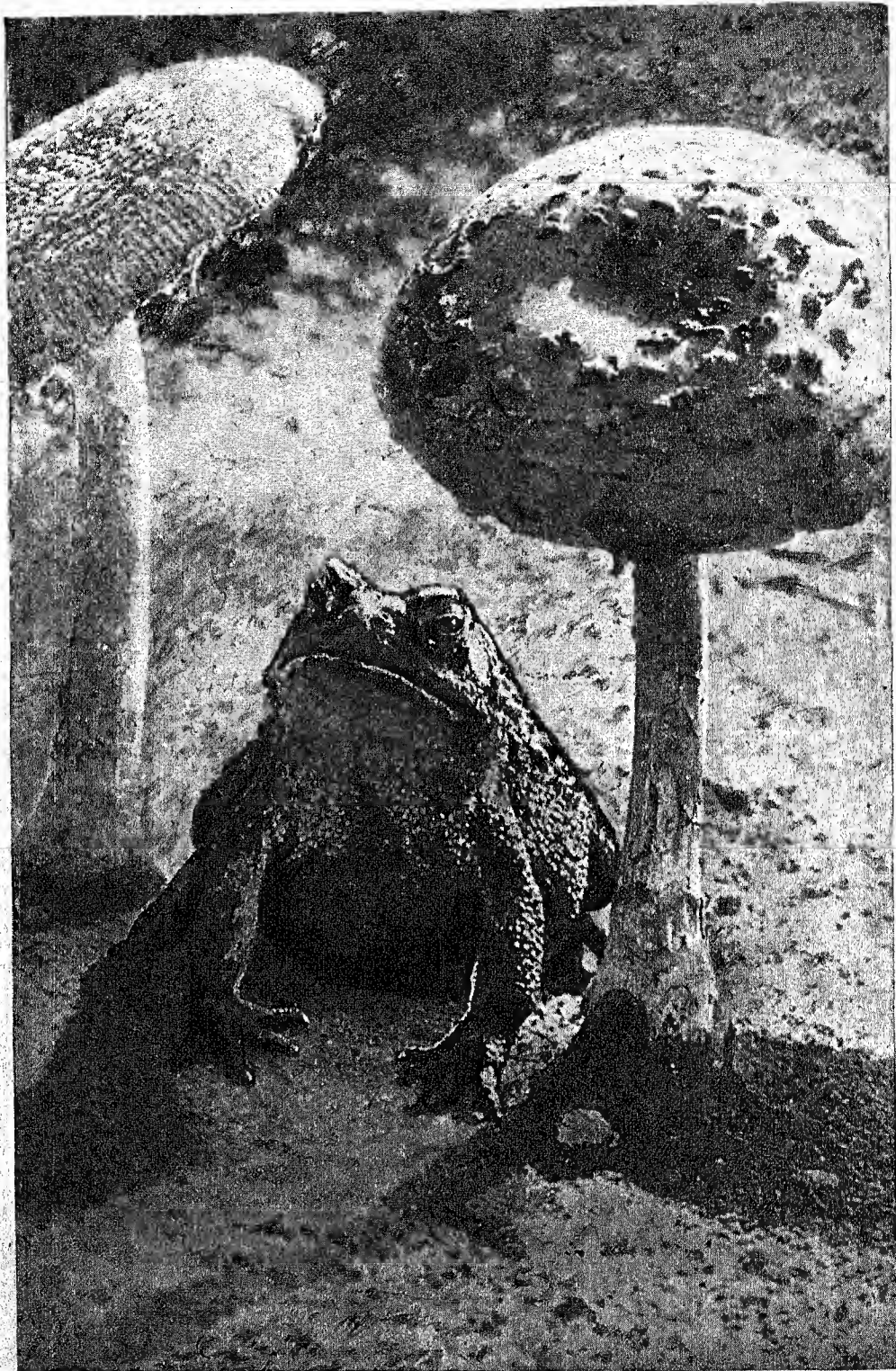


Photo: U & U

Toadstools Might Be Called Toad Umbrellas. This is an unusual nature photograph. A toad is endeavoring to enjoy the shade under his special parasols.

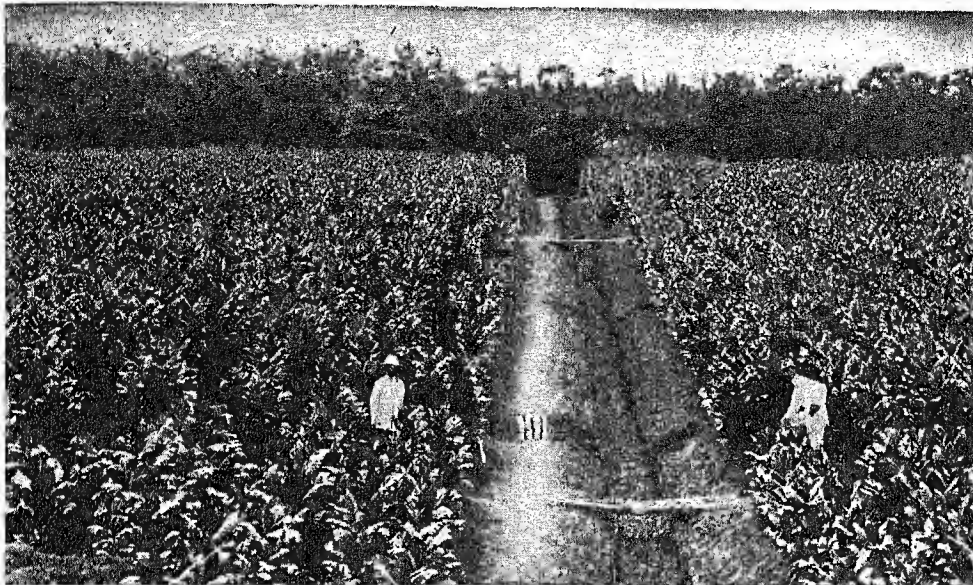


Photo: O R O C

A TOBACCO PLANTATION IN SUMATRA

The tobacco of Sumatra is largely used for wrappers on cigars. Ninety per cent of the island's production is exported to the United States.

beetles or over fifty army worms at a meal, and at the same time feed on countless others of the worst bug pests. Even in its infancy, the toad is a serviceable little creature. The tadpole eats the slimes of pools, and is the best scavenger of stagnant water.

M.J.H.

Scientific Names. The toad family is *Bufo*idae. The best-known species of Eastern North America are *B. americanus*, *B. terrestris*, and *B. fowleri*.

Related Subjects. For eighteen pictures showing the life history of the toad, see *NATURE STUDY*, page 4831. The reader may also refer to the following articles in these volumes:

Amphibians Frog Tadpole Tree Frog

TOADFLAX, OR BUTTER AND EGGS, a weed of the figwort family, with bright-yellow flowers and pale gray-green leaves, found along roadsides and in waste places throughout Central North America, as far west as the Rocky Mountains. The flowers, which grow in clusters along the upper part of the stem, are tube-shaped, with the edge cut into an upper and a lower lip, the former having two lobes and the latter three. A thick, orange-colored ridge on the middle lobe serves to cover the mouth of the tube, and this is forced open by the weight of the bee in search of nectar. Toadflax was introduced into America from Europe, and is an escape from gardens. It belongs to the same family as the snapdragon (which see). B.M.D.

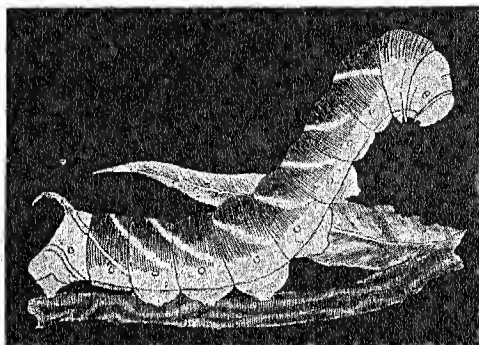
Scientific Names. The botanical name of the figwort family is *Scrophulariaceae*. The toadflax is *Linaria vulgaris*.

TOADSTOOL. See MUSHROOMS.

TOBACCO, *toh bak' o*, a plant of the nightshade family (*Solanaceae*), whose leaves have enormous commercial value. Tobacco is not a food, nor can it be said to fulfill any essential human need, but because its manufactured products are a source of pleasure to great numbers of the human race, it has an established place among plants cultivated for industrial purposes. Its effects are discussed under a subhead, below (see *Effects of the Use of Tobacco*, page 7196).

The Plant and Its Cultivation. There are several species of the tobacco plant, but that designated as *Nicotiana tabacum* (native to America) is commercially the most important. This plant grows from two to eight feet high, and bears long, pointed leaves and terminal clusters of rose-colored or pink-and-white, funnel-shaped flowers. The leaves grow directly from the stalk, and vary from twelve to forty-two inches in length. Different soils and climate have more influence upon the character of tobacco and the quality of the leaf than upon any other cultivated plant. The soils affect the color and texture of the leaf and the amount of nicotine it contains. The highly fertile limestone soil of the blue-grass regions of Kentucky produces the light-colored, mild variety known as *White Burley*; the red clay soils are best for the dark, heavy types; the light, sandy soil of the "Golden Tobacco Belt" in Virginia produces the yellow variety; and the strong, dark *Perique*, a variety much used for smoking tobacco, is grown in the heavy, black soil of Louisiana.

Tobacco is grown from seed sprouted in carefully prepared beds; in cold climates, the plants are started in hotbeds. The seed is very small, and a handful looks very much like a quantity of finely ground black pepper. When the young plants are six to eight inches tall, usually five or six weeks after the sowing, they are ready to be transplanted. The ground, meantime, has been thoroughly cultivated, and enriched with fertilizer. Long-leaf varieties



THE TOBACCO WORM

demand proportionately more space than do smaller varieties, and the distances between hills vary from twelve inches to four feet. If transplanting is done by machinery, from three to six acres a day can be worked. With hand labor, an industrious workman can set from one to two acres in the same time.

Frequent cultivating and the elimination of weeds and of insects and their larvae are necessary. Topping of the plants to prevent flowering, and to concentrate the strength in a few leaves, is practiced in the production of tobacco raised for leaves and not for seeds. Topping results in the formation of false leaves, or suckers, and these must be pulled off as fast as they appear. In several states, the United States Department of Agriculture has made experiments in the cultivation of tobacco under canvas covers. This method causes the plants to mature earlier and to bear finer and more delicately flavored leaves.

Harvesting and Curing. Tobacco leaves are ready for harvesting when the surface becomes a mottled yellow and green. The methods of cutting and curing vary for different kinds of tobacco. In some cases, the entire plant is cut down when the middle leaves are ripe, and in others the leaves are removed separately as each one matures. In harvesting White Burley, which is used extensively for making plug and fine-cut chewing tobacco, the entire stalk is cut, and then split more than half the length. The stalks are then wilted and placed astride a stick, at the rate of about seven plants to a stick. After being left for a time in the open air, the plants are taken to ventilated sheds,

where the leaves are cured by exposure to air. Yellow-tobacco leaves are stripped from the plants as they ripen, and are cured in houses equipped with flues that convey artificial heat. Heavy tobaccos raised in America for export to Europe are cured by the heat of open log fires, as the smoke imparts a creosotic flavor that is very popular with Europeans.

Perique, which is one of the choicest grades of smoking tobacco, and is prized because of its rich flavor, is cured by subjection of the leaves to great pressure. The Maryland type, a variety exported in large quantities to Holland, Belgium, and France, is air-cured, like White Burley, in ventilated sheds. A high-grade chewing tobacco with a sweet, delicate flavor, which is grown to a limited extent in Spottsylvania County, Va., is cured in the sun. This method is too expensive to be adopted generally. After tobacco is cured, it is softened in moist air, packed in boxes, and taken to the warehouse, where it must undergo a "sweating," or fermenting, process before it is ready for the market. This is for the purpose of improving aroma and texture.

Tobacco Enemies. The tobacco plant is subject to root rot, mosaic disease, or mottled top, wild fire, and a few other diseases, but the only serious insect pests that attack it are the larvae of two species of sphinx moth, which feed on the leaves. They are large, green caterpillars having diagonal white stripes along the sides, and a sharp horn at the back of the body. These worms also feed on the leaves of the tomato plant, another member of the nightshade family. Weeds of the nightshade group planted near tobacco fields will serve as a decoy for the pests, and heavy applications of Paris green will kill them. See INSECTICIDES AND FUNGICIDES.

Production. The United States is the leading country in the production, consumption, and export of tobacco. North Carolina, Kentucky, Virginia, and Tennessee produce about three-fourths of the annual yield; the remainder of the crop comes chiefly from South Carolina, Pennsylvania, Ohio, Georgia, Wisconsin, Connecticut, and Maryland. Flue-cured tobacco, used extensively in the manufacture of cigarettes, is produced chiefly in Virginia and the Carolinas. Large quantities are exported to Great Britain. Over seventy-five per cent of the Burley type is produced in Kentucky, and the remainder chiefly in Tennessee, Ohio, and Indiana. Nearly all of this crop is consumed in the United States. Cigar types of tobacco are produced chiefly in Pennsylvania, Connecticut, Wisconsin, and Ohio, and little of the yield is exported. The annual tobacco crop of the United States as a whole ranges between a billion and a billion and a half pounds (for comparison with other countries, see chart, page 7196).



Photos: Keystone

Tobacco-Growing in Connecticut. In the upper picture the young man is "topping" the plants—plucking off the flowering tops, so that ripening will be hastened. Below, at left, view of a leaf of the broad-leaf variety, at right, plants going to seed, to provide for next year's crop.

Holland first cultivated tobacco in Europe, but the industry soon spread to other countries. British India, Russia, Hungary, the Dutch East Indies, Japan, the Philippines, Porto Rico, Santo Domingo, Cuba, Brazil, Turkey, Greece, and Italy are all important tobacco countries. Since the World War, Can-



CENTERS OF PRODUCTION

The chief tobacco fields are indicated by the groups of dots on the map.

ada has developed a rapidly growing and profitable tobacco industry. The plant has long been cultivated by the "habitants" of the province of Quebec.

Manufacture. The manufacture of tobacco products is an industry of enormous proportions. Only the income tax is a greater source of revenue to the American government than the tax on tobacco in its various forms. The chief products are cigars, cigarettes, and smoking and chewing tobacco. The first steps in the manufacturing process are the cleaning and stripping of the leaves. By *stripping* is meant the removing of the midribs and stems. Tobacco for chewing may be either "fine-cut" or "plug." In the latter form, the tobacco is pressed into cakes and flavored with vanilla, licorice, chocolate, sugar, etc. Pipe tobacco is finely cut or sliced, and marketed in small bags or tins, or is put up in thin cakes or rolls, to be cut up by the smokers. North Carolina leads in the manufacture of cigarettes, and Pennsylvania in the making of cigars. The popularity of cigarettes has so increased since the World War that the annual output is now about 80,000,000,000.

Cigars are made from carefully selected leaves, for the inner material, known as the *fillers*, must be of uniform quality. A cigar consists of core (fillers), an inner cover, or binder, and an outside cover, or wrapper. The core must be so arranged that the cigar will burn evenly and the smoke will be freely drawn through it. The two covers are made of tobacco leaf, and the outside piece is shaped

so that it can be wound about the cigar in a spiral. After being wrapped, the cigar is dried in the sun or in mild artificial heat.

The finest cigars made are manufactured in Cuba of a native tobacco called *Vuelta Abajo leaf*. The word *Havana* is the trade name for all cigars made from Cuban tobacco, but genuine *Havanas* are produced only in the island or in Florida, where there are a number of factories having Cuban workmen. In the manufacture of high-grade cigars, much of the work is done by hand, but cheaper brands are generally made by machinery. See, also, CIGARETTE.

Effects of the Use of Tobacco. Ever since tobacco was first used in Europe, its influence upon the health and morals has been the subject of much discussion. Most of the injurious effects are due to the presence of nicotine, which is a poisonous alkaloid. Like alcohol, opium, tea, and coffee, tobacco possesses nar-

BY COUNTRIES

United States 1304	British India 1103
Greater Russia 356	Java 155
Brazil 148	and Madura 155
Greece 136	Japan 144
Turkey 118	Philippines 104

BY STATES

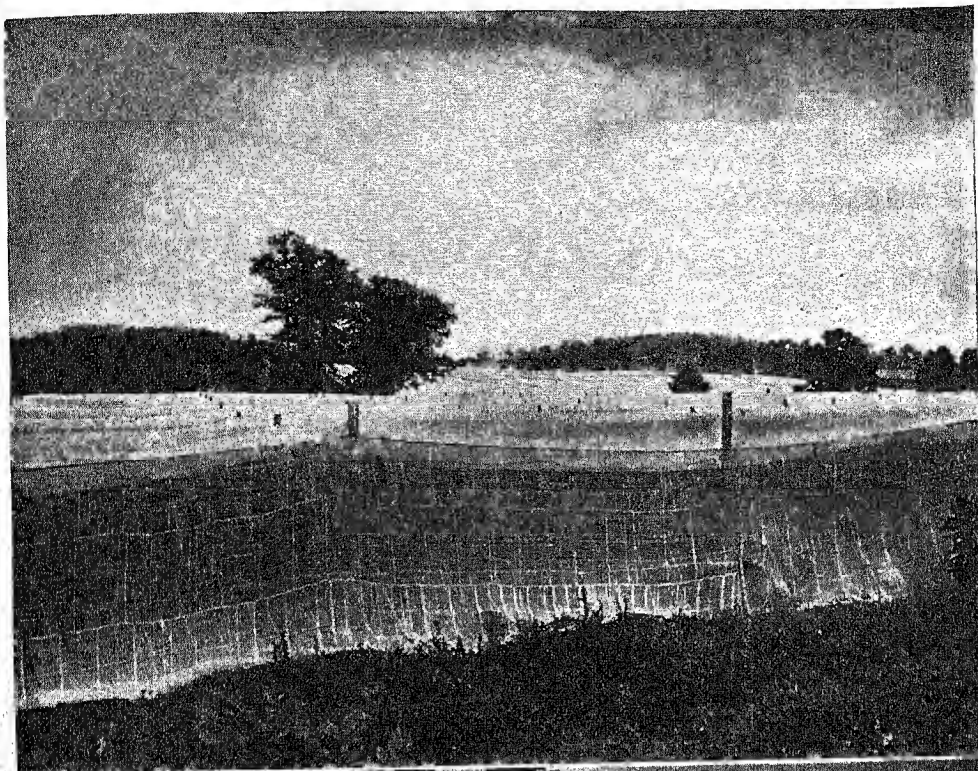
North Carolina 443	Kentucky 302
Virginia 126	Tennessee 72
	South Carolina 89

Figures Represent Millions of Pounds

TOBACCO PRODUCTION

Figures are from Federal and state sources, and represent averages for three years.

cotic properties, and it is generally agreed that its use in excess is harmful, and that its habitual use by the young decreases bodily and mental vigor and development. After mental or physical strain, its narcotic properties have a soothing and restful effect upon the nerves, and it is to this quality that it owes its wide popularity. No reasonable evidence has been produced to show that the use of tobacco deadens the moral sensibilities, as is true of opium, morphine, and alcoholic drinks, and many psychologists and medical men, after careful investigation, have come to the conclusion that there is no serious objection to its moderate use by adults. The smoke of tobacco usually contains nicotine, and is harmful when inhaled.



Photos: Keystone

Shade-Grown Tobacco. Above, tents over a tobacco field near Hartford, Conn. Below, trucking the tent-grown product from the field to the curing barn.

History. Although it is believed that tobacco was used in China in ancient times, the knowledge of the plant and its uses spread to the rest of the world through America. At the time Columbus discovered the New World, the Indians were smoking and chewing tobacco, and using it as snuff. Their pipe of peace was employed in tribal ceremonies that had been practiced for centuries. The plant was introduced into Spain from Santo Domingo in 1559, and in the same year, seeds were sent to France by Jean Nicot, the French ambassador to Portugal, who gave his name to the essential principle of the plant, and to the genus, *Nicotiana*. Sir Francis Drake took tobacco to England in 1585, but it was through the illustrious example of Sir Walter Raleigh, who "took a pipe of tobacco a little before he went to the scaffold," that smoking spread among the Elizabethan courtiers. Although smoking was strongly opposed by the Church and State, and its devotees were threatened with severe penalties, such as the lash, excommunication, and even capital punishment, the popularity of tobacco spread with amazing rapidity in the seventeenth century, throughout the nations. G.M.S.

Related Subjects. The reader is referred in these volumes to the following articles:

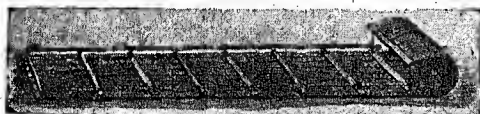
Anti-Cigarette League
Cigarette
Internal Revenue

Narcotic
Nicotine
Snuff

TOBACCO ROOT. See BITTERROOT.

TOBACCO WOOD. See WITCH-HAZEL.

TOBOGGANING, *toh bog' an ing*, an exhilarating outdoor sport, which consists of coasting on snow or ice by means of toboggans, or sleds without runners. A typical toboggan is shown in the accompanying picture. It is made of strips of hickory, ash, or maple, turned up in front and fastened together by crosspieces.



A TOBOGGAN

The surface that touches the snow or ice is highly polished, and there is a light handrail on each side. The sled is usually about a foot-and-one-half wide and from six to eight feet long. A toboggan load consists usually of four people, the one at the rear acting as steersman, by means of an extended moccasined foot. In mountainous countries, the snow-covered hills are used for slides, but in level localities, chutes are constructed on scaffolding, with a platform at the top for the take-off. A tremendous rate of speed is possible, 900 yards in thirty seconds having been recorded.

Toboggans were originally built by Indian hunters to carry their game across the snow.

They were first built of bark, turned up in front to breast the snow. The Eskimos made sledges of strips of whalebone until recently; now they are able usually to obtain strips of iron, or, more commonly, lengths of wood, which they obtain from explorers. See illustration, article QUEBEC (city).

TOBOLSK, *toh bolsk'*. See SIBERIA (People and Cities).

TODD, MARY, the wife of Abraham Lincoln (which see).

TODOS SANTOS, a peak in Bolivia. See BOLIVIA (The Land and Its Rivers).

TOGA, the distinctive garment of the Roman citizen, which was draped about the entire body and allowed to fall in loose, graceful folds. Originally it was worn by both men and women, but gradually the women replaced it with the stola (which see). Later the use of the toga was restricted to the Roman citizen, and it was required on all formal occasions.



ROMAN TOGA

The shape of the toga and the manner of draping it changed from time to time, becoming more complicated and elaborate with each period. It was probably originally rectangular. In the early Republican period, two of the corners were rounded off quite markedly so that the lower edge roughly formed a semicircle. In the late Republican period, the other two corners were cut off at an angle.

Although the dimensions of the garment differed with its type and period, usually it was a little longer than the height of the wearer as measured from the top of the breastbone to the floor, and in width, at least twice the girth of the wearer measured at the waist line. The fabric was wool and usually white, however, colored borders or a different colored material were used to distinguish the office or station of the wearer.

When the Roman youth reached the age of sixteen years, he put off his purple bordered toga and was invested with the *toga virilis*, the toga of manhood, which was also called the *toga pura*, because it was white. The *toga praetexta* with its purple border was worn by

magistrates and high priests. Candidates for office had their togas whitened artificially, and the garment was called *toga candida*. The *toga picta*, or *toga palmata*, was used at first for honoring victors; it was likely purple and richly embroidered. Later it was used by emperors as their official dress. The toga of the Imperial period was elaborate and massive, probably only worn on formal occasions because it was cumbersome and required careful draping. The toga was never a practical garment, but it was an excellent protection against the dampness.

The importance of the toga is today reflected in current speech. Thus, the men who assume the duties of lawmaking, especially Senators, are said, in figurative language, to have "donned the toga." J.G.H.

Derivation. *Toga* is derived from the Latin *tego*, meaning *I cover*.

TOGO, *toh' go*, HEIHACHIRO, Count (1847-1934), a Japanese admiral and naval hero of the Russo-Japanese War, was born in Kago-shima, of a family belonging to the military nobility. He entered the naval service at the age of sixteen, later received instruction on the British war vessel *Worcester* and at the Naval College at Greenwich, and in 1894, while commanding the *Naniwa*, fired the first shot in the Chinese-Japanese War. Promoted to rank of vice admiral in 1900, he was made commander of the naval dockyards at Maizuru, and in that capacity did much to build up the navy which, under his command, signally defeated the Russians in 1904-1905. For his part in that struggle, see the article RUSSO-JAPANESE WAR. In 1912 Count Togo was made admiral of the Japanese fleet, which now ranks third among the world's navies.

TOGO AND TOGOLAND, *toh' go land*, mandated territories of West Africa, under French and British influence, respectively; formerly, a German colony, annexed by Germany in 1884, and captured by troops of France and Britain in 1914. The entire territory was long known as Togoland; Great Britain retained the name when the two conquering nations divided it and received governing mandates from the League of Nations, in 1919, while France renamed its section Togo.

The entire area is a narrow strip extending north from the Gulf of Guinea, with Dahomey on the east and the Gold Coast Colony on the west; the coast line is only thirty-two miles in length, but farther north the width of both sections is over seventy-five miles.

Togo. The French section occupies two thirds of the entire area, 21,893 square miles in extent, and has 780,000 (1938) native inhabitants, and 497 Europeans. More than thirty languages are spoken by the natives, the larger portion of whom are offshoots from the Bantus (see BANTU). The seat of adminis-

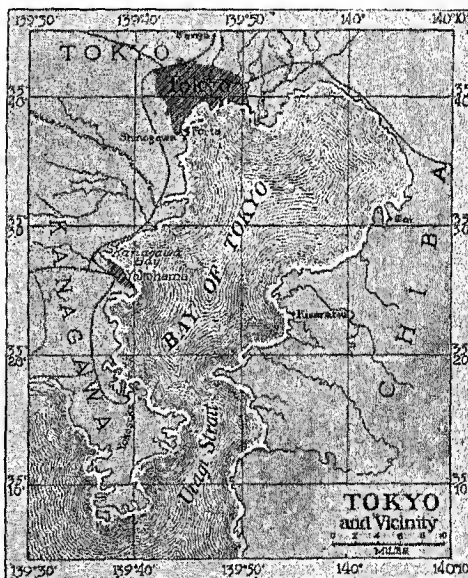
tration is at Lome, a seaport on the Gulf of Guinea, population 14,106 (1938) natives and 274 Europeans.

Togoland. The British section is west of Togo, and borders the Gold Coast Colony, to which it is attached for administrative purposes. No part of its area of 13,041 square miles touches the coast. The native inhabitants number about 391,500. There are less than fifty whites.

The climate of Togo and Togoland is hot and unhealthful. Old Togoland was once in the center of the slave trade, and to it was due any early importance of Lome, the seat of administration of Togo. The principal exports are palm kernels, rubber, cocoa, ginned cotton, tapioca, and copra. Yams, kola, cassava, tobacco, and coffee are also extensively cultivated. The natives are expert wood carvers, and have considerable knowledge of dyeing and weaving. Elephants and lions are found in the interior, but the elephants have been so much hunted for ivory that they are becoming scarce.

TOKEN MONEY. See MONEY (Classes).

TOKYO, OR **TOKIO**, *toh' ke o*, the capital and the largest city of the Japanese Empire, is situated on the Bay of Tokyo, on the south-eastern shore of the island of Honshu. Sixty



miles west of the city, and visible from almost any point of the island, as well as far out at sea, rises the lofty white cone of Mount Fujiyama.

Tokyo in 1922 annexed surrounding suburbs until its area reached 161 square miles. Its population was 6,581,100 in 1939, making it the third city in size in the world. For the last decade or longer, Tokyo has been assimilating European and American ideas in sanitation, building, and transportation, until it has become the most progressive and cos-



Modern Tokyo. Above, air view of the main section of the business district. One of the elevated railroad lines is shown in the center of the picture. Note the wide boulevards for automobile traffic. Below, a view in the subway showing tracks and trains. The small picture at the left shows a Japanese girl paying her fare.

mopolitan city of Japan, characterized by ancient picturesqueness and the modern customs, costumes, and conveniences of Western civilization. The city's advance was halted, however, on September 1, 1923, by the most disastrous earthquake and fire the modern world has known, when a large part of the metropolis was destroyed; after the earthquake ceased, the resulting fire swept over twenty-five square miles of the city's area. Though temporary restoration began immediately, and communication and public services were completely restored within a few months, there cannot yet be an adequate description of the new city, so rapidly is it being rebuilt and modernized.

The city occupies both banks of the Sumida River, sometimes called "the Thames of Tokyo," the flat areas constituting lowland Tokyo, while in the western outskirts rise hills from fifty to over a hundred feet in height. A network of canals occupies the lowland section, and these and the river are spanned by numerous bridges. The most conspicuous feature of the city is the Imperial Palace, on the site of the old castle of the shogun, which was burned in 1872. The palace is a beautiful structure, partly in the Japanese and partly in the European style of architecture; and the surrounding grounds, in which stand several modern government buildings, constitute one of the loveliest parks in Tokyo. The palace was one of the buildings that escaped destruction by the great earthquake and fire.

The section east of the royal palace is occupied by warehouses, banks, shops, newspaper offices, and other commercial buildings. In this section, crossed by jumbled streets and alleys, one saw, before the 1923 disaster, small wooden shops and houses, mud buildings, and modern structures of brick and stone; rebuilding plans included the widening and straightening of most of the streets. The northern part of the city contains the arsenal; the Imperial University; Ueno, an extensive park containing the Zoological Gardens, the Imperial Library, and the Imperial Museum; and a famous temple to the goddess of mercy, in a spacious park that is a favorite resort for the people on holidays. In 1925 the Rockefeller family gave \$2,000,000 to the University Library. In 1936, the Imperial Diet building was opened. It is in Western style.

The section east of the river is especially interesting to tourists, because here may be seen the flower displays of cherry blossoms, wisteria, and iris for which Tokyo is famous; and the great wrestling matches, held in the temple of E-ko-in. The so-called Foreign Concession is on the west bank of the Sumida, but for a long time there have been no restrictions as to the section in which foreigners may reside. The streets leading from the foreign quarter

contain many shops, where wonderful ivory carvings and other specimens of Japanese handiwork are displayed.

Tokyo is governed by a mayor, a municipal council, and a municipal assembly. The city is not so important a commercial or industrial center as some other towns in Japan, though many factories have been established. Tokyo is the outgrowth of a small village called Yedo, and the city which developed from this hamlet was known as Yedo until 1868, when the present name was adopted.

Tokyo was one of the first Japanese cities to be attacked during World War II (which see) when American planes under the command of Captain James H. Doolittle, bombed the city on April 18, 1942.

TOLEDO, *toh le' doh*, OHIO, a port of entry and the county seat of Lucas County, situated in the northwestern part of the state, on Maumee Bay, at the mouth of the Maumee River. It is nine miles from Lake Erie, of which Maumee Bay is an inlet, and its northern limits extend almost to the Michigan state line. Cleveland is 113 miles east, and Columbus 134 miles south. The city lies on both sides of the Maumee, which curves at this point, before emptying into the bay. Most of the city is on the west side, which is connected with the east side by seven bridges. The harbor of Toledo extends for thirty-five miles along the shores, and can accommodate the largest lake vessels, having a minimum depth of twenty-one feet. The population of the city in 1940 was 282,349 (Federal census), including a large foreign element, chiefly German, Irish, Polish, and Hungarians.

Features of Interest. The city is well supplied with large hotels and business buildings. It has shaded residential streets and beautiful schools and public buildings. There are 615 miles of streets, of which 493 miles are paved; twenty-one miles of boulevards; and a park system covering 2,240 acres. The Zoological Park, the Soldiers' Memorial, the Newsboys' Building, the Naval Armory, and the Museum of Art all well repay inspection.

Transportation. Railroad facilities include the Ann Arbor; Baltimore & Ohio; Big Four; Chesapeake & Ohio; New York Central; Nickel Plate; Pennsylvania; Pere Marquette; Wabash; Wheeling & Lake Erie; Detroit, Toledo Shore Line; Detroit, Toledo & Ironton; Michigan Central; Toledo, Angola & Western; and the Toledo Terminal railroads. It is the third largest railroad center in the United States, and a focal point for motorbus, motor truck, and interurban lines. The city is served by seven Federal highways and is located on the transcontinental passenger and air mail route. Toledo is second in tonnage of Great Lakes ports.

Industries. The city is an important shipping point for iron and soft coal from West

Virginia, Ohio, and Pennsylvania. There are four large oil refineries, and about 700 manufacturing plants, including automobiles, glass, canvas goods, children's vehicles, springless scales, oil-well producing machinery, and pig iron. Toledo is the second largest producer of automobiles, automobile parts and accessories, and a world center for glassmaking. Shipbuilding, atomizers, industrial metal stampings, and coffee and spice grinding are important. The city is a leading market for clover seed, hay and grain, and winter vegetables.

Institutions. Among the educational institutions are the University of the City of Toledo, founded in 1872 as a trade school and organized as a municipal university in 1884; De Sales College, Roman Catholic, founded in 1898; Toledo Medical College; the Smead School for girls; several other private secondary schools; sixty public and thirty-five parochial schools; a public library with fourteen branches; and a world-famous Art Museum with a fine collection of Egyptian antiquities and many notable paintings.

The benevolent institutions include a state hospital for the insane, which is conducted on the cottage plan; Saint Vincent's Hospital, Saint Vincent's Orphanage, the county hospital, the county children's home, and the Lutheran Orphan Asylum.

History. The city of Toledo lies within the limits of a large tract of land acquired in 1795 by the United States from several Indian tribes. About the year 1800, a stockade was built, and, almost prophetically, was called Fort Industry. Two separate land companies, buying from the government most of the land now the site of the city, laid out two villages, Port Lawrence in 1817, and Vistula in 1832. These villages were united as a town in 1833, under the name of Toledo, and a city charter was obtained in 1837.

What is known as the Toledo War was a contest in 1835 between the state of Ohio and the state of Michigan for the possession of a strip of rich agricultural land including the site of Toledo, which was recognized even then as being commercially important. In June, 1836, Congress decided the dispute in favor of Ohio, but Michigan, when it was admitted to the Union, in 1837, received the Upper Peninsula as compensation.

The opening of the Wabash & Erie Canal in 1843, and of the Miami & Erie Canal two years later, and the construction of steam railroads to this point in 1837, were important factors in the growth of the city.

The civic administration of Toledo became famous at the beginning of the century, when Samuel Milton ("Golden Rule") Jones, as mayor (1897-1905), introduced actual business methods into the management of the city. In 1935 the city manager plan was adopted with a

council of nine elected at large. A comprehensive plan has been adopted for future construction in the city, under the auspices of an official city-plan commission.

A.J.Ho.

TOLEDO WAR. See history sections of MICHIGAN, OHIO, and TOLEDO.

TOLERATION ACTS, laws providing for freedom of religious worship. In 1689, the British Parliament passed the Toleration Act granting freedom of worship to non-conformists (which see). However, it did not convey any political rights. In 1649 a toleration act, granting religious liberty to all Christians was passed by the assembly in the colony of Maryland.

TOLL, *tohl*, a tax or duty paid for the exercise of a liberty, privilege, or advantage; usually, a charge for use or enjoyment of a public service. One of the commonest forms of tolls was that which confronted every traveler over turnpikes in the United States and Canada, during the greater part of the nineteenth century. At regular intervals, a gate was placed across the road, to be raised only after the traveler had paid toll. The charge varied but was usually five or ten cents. Such tollgates are still found in many parts of Europe, but they are now comparatively rare in North America. The proceeds of this tax are used to pay for repairs, thus making it possible to maintain fairly good roads.

Another form of toll, still common in Europe, and apparently on the increase in America, is the bridge toll. See TOLL BRIDGE; TRAILS OF EARLY DAYS.

Tolls are charged on a number of canals of international importance, including the Suez, the Sault Sainte Marie, and the Panama. The charges are moderate, based on ship tonnage, and are designed merely to pay the cost of maintenance and interest on the capital invested.

The fare charged by a ferryman is sometimes called a toll; so, also, is the fee, in cash or in grain, charged by a miller for grinding grain into flour.

Derivation. The word *toll* is derived from a Greek word for *tax*, and originally meant *something counted*; as tax collectors had to count sheep and many other things, the idea of counting became associated with taxes. At first, any kind of a tax was a toll; later, it was only a special tax or charge for a service, as defined above.

TOLL BRIDGE. While the highways of the nation are built from public funds and are free to the public, the same thing cannot be said of bridges. The automobile has brought the toll bridge back into prominence. There are almost three hundred of such bridges on main-traveled highways in the United States, and others are being planned.

Frequently, when a state has built its main roads up to river intersections, it is unable to

finance the building of the necessary bridges. Crossing the rivers is left to ferries, which are of limited capacity and slow in operation. Private capital, seeing an opportunity for large returns, offers to build the bridges in return for the right to collect toll. The income from this source is amply sufficient to justify the large investment required. According to the Federal Bureau of Highways, the income from 233 toll bridges in one recent year was 11.7 per cent on the investment. This was net income, after all operating costs had been deducted.

Some of the bridges are even more profitable. For example, the publicly owned bridge over the Columbia River, at Portland, Ore., received in one year an income equal to twenty-nine per cent of the original cost of the structure.

One state, Kentucky, has legalized a plan to finance bridges by bond issues. Under this plan, when the tolls pay off the principal, the bridges are then to become free. While, under this system, the traffic still pays toll, it does so in the knowledge that it is paying only actual cost, and that there is a prospect of ultimate freedom.

There are now only nine states in which there are no toll bridges. Of the total number, more than two thirds are privately owned. Some of them have been financed through the activity of chambers of commerce in the river towns, in order to divert tourist business their way. The average motorist will go miles out of his way to avoid a ferry. Hence a bridge may not only be profitable in itself, but may confer many indirect benefits on a community.

TOLLENS, *tol' enz*, HENDRIK. See NETHERLANDS, THE (Language and Culture).

TOLSTOY, *lahl sioi'*, ALEXEI. See RUSSIAN LITERATURE.

TOLSTOI (also spelled Tolstoy), COUNT

LYOFF NIKOLAYEVITCH (1828-1910), a Russian novelist, essayist, and moral philosopher, born at Yasnaya Polyana, in the province of Tula, September 9, 1828. His family belonged to the old Russian nobility, and the boy received every advantage of cultured environment. He was educated by French tutors and at the University of Kazan, but he was in constant revolt against the narrow views of the latter institution. Kazan was a center for Russian social festivities, and he spent most of his time in society, gradually assuming an attitude of contempt for academic learning. His inquiring mind, however, was beginning to assert itself.

Service in the Army. In 1847 he left the school, broken in health and disturbed

about his mental and moral condition. His parents had died while he was still a child. At home he found misery and rebellion among his serfs, and vainly undertook to bring happiness and prosperity again to his estates. Almost in despair, he gave himself up for a time to gambling and carousing, but his nature rebelled against dissipation, and in 1851 he entered the Russian army in the Caucasus, and spent much time in Cossack village garrisons, with an occasional military expedition into the mountains. In the midst of such conditions, he began to write. His first accepted story was a simple but sincere account entitled *Childhood*,



COUNT TOLSTOI
The Russian sage in peasant garb.

and was soon followed by *Boyhood* and *Youth*. These dealt with the scenes and incidents about his own home, but also showed clearly the influence of Rousseau—whose works he had read at Kazan—in their belief in an education derived largely from nature.

He next served in the Crimean War, and during the siege of Sebastopol wrote his famous *Tales from Sebastopol*. Then, weary of war and seeing absolutely no glory in bloodshed, the young man returned from the army and went to Saint Petersburg (now Leningrad).

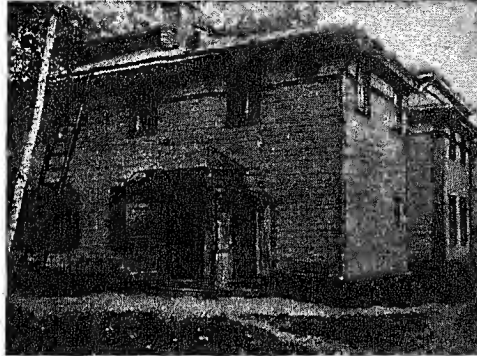


Photo: O R O C

THE HOME OF TOLSTOI

It was situated in a poor section of Moscow, and was typical of the simplicity of the life of Russia's great writer.

He found that his magazine stories had made a name for him among Russian authors, but his views on society, religion, war, and politics were so different from those held by other writers that he could not at that time name an intimate friend in all Russia.

New Theories. Between 1857 and 1861, Tolstói visited Germany, France, and England, to see how common workmen fared in those countries, and returned home profoundly impressed with the belief that Russian social conditions were wrong. His serfs having been freed by the Emancipation Act of 1861, he settled on his estate as a magistrate, and opened a school where ideas of compulsion were never permitted. In believing that teaching should be adapted to the individuality of the pupil, Tolstói foresaw the new theories only now being generally recognized. This aristocrat and rising author became a humble teacher of peasant children, and for nearly two years taught singing and drawing. The institution then closed, and he gave up his magistracy, because of the secret hostility of the government, and turned once more to his farm for consolation. In bitterness of heart against military and civil oppression, he wrote two violent stories, *Three Deaths* and *The Cossacks*.

His marriage in 1862 seems to have brought more peace of mind and concentration, and

soon afterward he began his greatest novels, *War and Peace* and *Anna Karenina*. The first, one of the masterpieces of the world's literature, deals with Russia between 1805 and 1815, and is a powerful indictment of warfare and the worship of "heroes." During his thirty-fifth year, his anxiety for the welfare of his fellow men increased. His *Death of Ivan* and *The Power of Darkness* reveal the change, for in those books his sympathy for suffering humanity is almost beyond his power of expression. Then came his rebellion against the Greek Orthodox Church, as shown in *A Confession* and *My Religion*. It appeared as though he were in revolt against religion, society, and civilization itself; but it was clearly only the longing of a noble heart to right wrongs.

Entered Upon Simplicity of Life. His married life for many years was both happy and prosperous, his farming successful, and his income increased by the sale of his books. Nevertheless, in 1880 Tolstói renounced a life of ease, for ten years labored all day in the fields as an ordinary workman, ate no meat, gave up tobacco, allowed his hunting gun to rust, and lived what he called the life of simplicity. One night, in 1888, he announced to his family that the next day he would divide all his property among the poor and live a life of poverty; only after hours of pleading did his family persuade him to turn the entire estate over to his wife. Thenceforth he never had a penny of his own. He refused money for his writing, earned his living by farming and making shoes, and associated almost entirely with the peasants. He adopted the policy of non-resistance, and declared that Christ had enjoined such peaceful methods by his words "Resist not evil" (*Matthew* v, 39). Under those conditions, he wrote such masterpieces as *The Kreutzer Sonata*, one of the most vivid pictures of sordid life in all literature, *Master and Man*, *What Is Religion?*, and *The Resurrection*.

In 1901 he was excommunicated by the Greek Orthodox Church because of his teachings, and when he died, in a hut at Astapovo, where he had gone to avoid admirers, he was denied a religious funeral and a grave in a regular cemetery. Two questions which he ever sought to answer—*Why do I live?* and *How should I live?*—form the basis of most of his writings, and in his efforts to solve these problems, he produced literature that will always have a deep influence because of its sincerity, thoughtfulness, sympathy, and stern justice.

What Tolstói Taught. It was not until 1844 that Tolstói began to propagate his moral and religious beliefs, and found followers who became organized as a new sect. His religion was expanded in two works, *What I Believe In* and *A Short Exposition of the Gospels*. He

believed that God is not personal, but is the supreme *Good and Reason*; that Jesus was great, but not the only teacher of the truth; and that God and the Kingdom of God are "inside us." Man's aim in life, he believed, is to achieve happiness by doing right and avoiding all forms of evil. Believing that all forms of violence are wicked, he opposed conscription, or compulsory military service, as violence on the part of the State; but he also opposed revolution as evil, because it breeds hatred and violence.

He taught that love and compassion should be bestowed upon all living things, and that the social order can become better only when all men have learned to love and understand each other. He also prescribed vegetarianism and abstinence from intoxicants, drugs, and tobacco. He was bitter in denouncing the wealthy and all forms of capitalistic monopoly; and the opposition to military service which he taught caused many of his followers to be imprisoned or banished to Siberia.

Other Works. Besides the works mentioned above, Tolstoi's published works include *The Story of Yesterday*, *Two Hussars*, *The Memoirs of a Madman*, *Father Sergius*, *The False Coupon*, *The Devil*, and *What Is Art?* The last-mentioned is one of the most remarkable books ever written on the well-worn subject.

Tolstoi also wrote several powerful plays, including *The Power of Darkness* and *The Living Corpse*; and a light comedy, *The Fruits of Enlightenment* satirizing the fads of so-called "society."

TOLTS. See NEWFOUNDLAND (Physical Features).

TOLUENE. See COAL TAR (Derivatives).

TOM, MOUNT, a mountain in western Massachusetts, near Holyoke (which see).

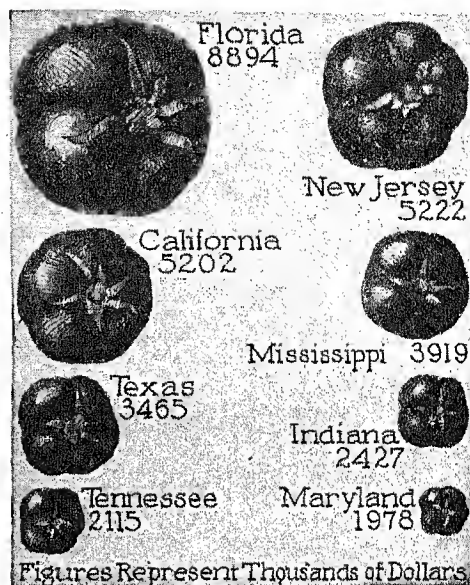
TOMAHAWK, originally, a war club or hatchet, used by the North American Indians. In early times, tomahawks were clubs of deer horn or stone, attached by cords of skin to wooden handles. When the Europeans formed alliances with the Indians, they introduced a new kind of tomahawk which could be used either as an implement of warfare or as a tobacco pipe. The handle formed the stem, and the blunt side of the hatchet head was hollowed out to hold the tobacco. Tomahawks were employed in close conflicts, or were thrown with great skill from a distance, so that the sharp edge of the hatchet would strike the enemy.

[The phrases *burying the hatchet* and *digging up the hatchet*, Indian expressions which have been Americanized, are equivalent to *making peace* and *declaring war*.]

TOMATO, *toh ma' toh* or *toh mah' toh*, botanically a fruit which is used as a vegetable, and is eaten either raw or cooked. It belongs to the nightshade family, just as do the pota-

to, eggplant, tobacco, belladonna, and jimson weed. It is interesting to note that, while the valuable part of the tomato plant and the eggplant is the ripened ovary, or fruit, the edible part of the potato plant is its tuber, and the only usable part of the tobacco plant is its leaf.

The tomato was originally native to South America, probably Peru or Brazil, and was first introduced into Europe and North America as a decorative plant of the flower garden, the fruit being known as the *love apple*. It was



THE CROP

Average value of the tomatoes grown in a year in the states leading in production.

not until early in the nineteenth century that people discovered that it was good to eat, and began using it as a food. The leaves and other green parts were avoided, however, for they were sometimes found to be quite poisonous. The edible part of the tomato is really a berry, which has been changed, through scientific breeding and cultivation, from a tiny, irregular-shaped, wrinkled fruit into the tomato of today. There are hundreds of varieties, but commercial production is limited to less than a dozen kinds.

Tomatoes are very sensitive to frost, but otherwise they are easy to cultivate. The seed should be planted indoors under glass; the young plants are transplanted to the field or garden as soon as the danger of a killing frost is past. If set three and one half feet apart, the plants will have room to develop without crowding, and will give opportunity for clean cultivation. If the plants are tied up and trained on stakes or a trellis, they will grow often to a height of six feet. If, in addition, the vines are pruned to one or two stems and

the fruit is kept off the ground, the yield of early fruit is increased.

Food Value. Though tomatoes contain so much water that they have low fuel value (see CALORIE), they are among the most important of the regulatory foods, because they are rich in mineral salts and vitamins (which see). Vitamins are not destroyed by cooking in sealed containers, and are present in the canned product. When oranges are not available, young children should be given tomato juice, the specialists say. Tomato juice "cocktails" are now served in most restaurants. Tomatoes are attractive in appearance and flavor, and though they were originally thought to be poisonous, they have won a place in practically every American household. They can be served fresh as salad, stewed or broiled, used for soups, and cooked with macaroni and other foods. Sauces, pickles, and relishes are made from tomatoes, both green and ripe, and large quantities are canned. In America, Maryland and New Jersey are the leading states in tomato-canning. See FOOD PRODUCTS, PRESERVATION OF. B.M.D.

Scientific Name. The tomato belongs to the family *Solanaceae*. Its botanical name is *Lycopersicon esculentum*.

TOMB, loom, any chamber wherein the dead are buried, whether hollowed out of the rock or built above ground. Often a tomb is a combination of these

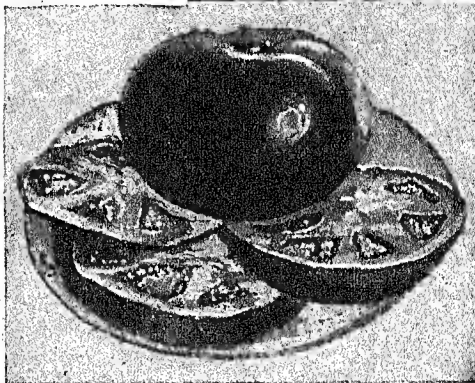
types. Like most burial customs, the use of tombs among the ancients was originally an outgrowth of a belief in the immortality of the soul. The Egyptians, for instance, believed that a man's *ka*, or double, haunted his burial place, waiting its time to reinhabit the body, and they consequently carved or painted on the walls of their tombs objects in which the deceased had been interested. Tombs were very common among the Egyptians, as indeed they were among almost all Oriental peoples. The pyramids are the most impressive examples of their peculiar form of sepulchral architecture, but no-less interesting are the tombs hewn in the rocks, with their numerous chambers and labyrinthine passages.

The Jews made use of such rock burial places; Christ was placed in a new rock sepulcher belonging to Joseph of Arimathea.

The Greeks, too, made use of both types of tombs, the older form being the rock-hewn.



Their raised tombs were, for the most part, very simple affairs, although in the colonies in Asia Minor, very elaborate structures existed. The most famous of these, accounted one of the Seven Wonders of the World, was the tomb of Mausolus, at Halicarnassus in Caria, from which the word *mausoleum* is derived. The Romans gave far more attention than did the



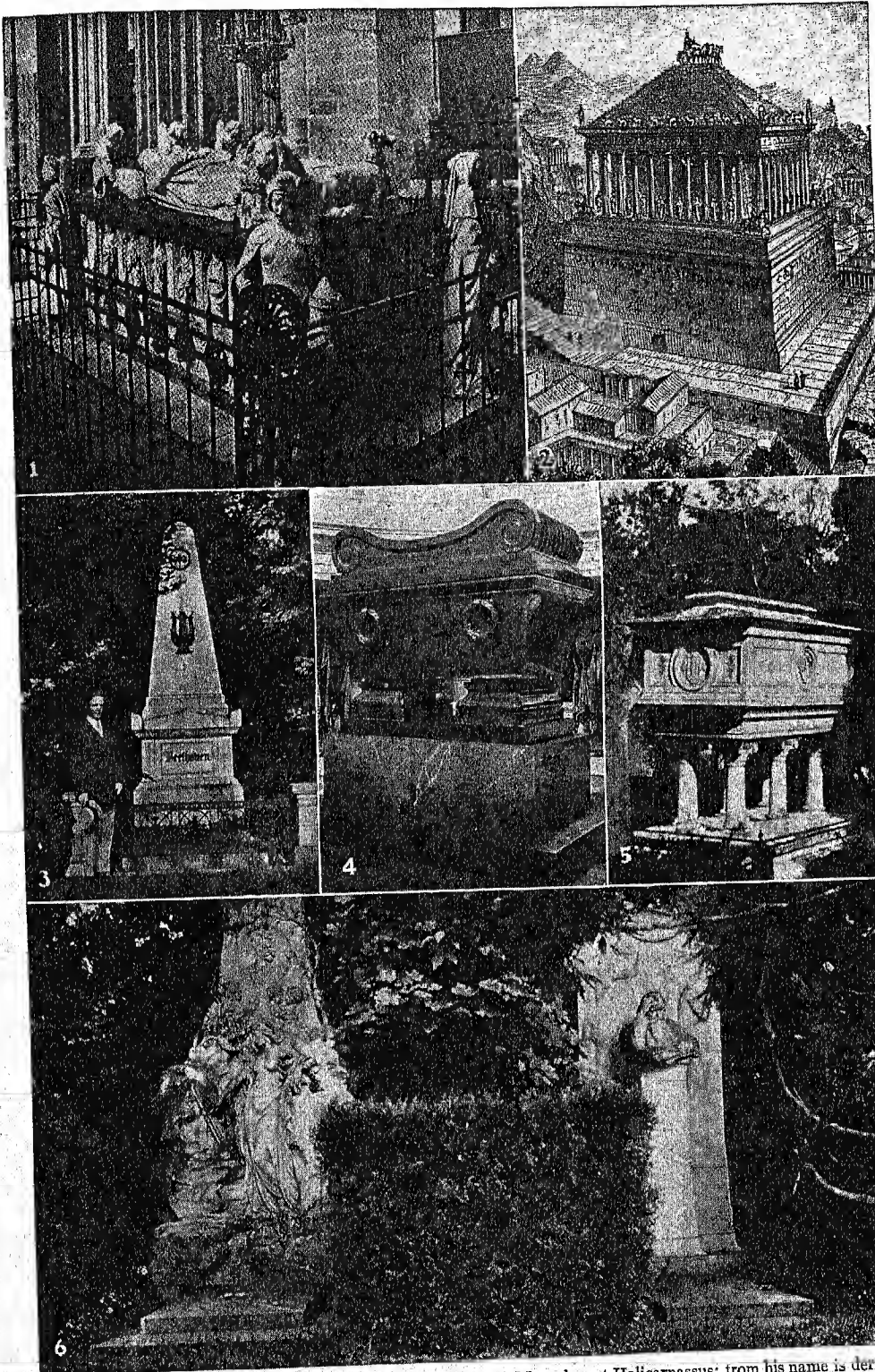
THE TOMATO

In the upper illustration, a blossom and well-formed fruit are seen on the same vine.

Greeks to the erection of memorials to the dead, and along the Appian Way were numerous tombs. On the Vatican side of the Tiber may be seen to-day the great circular tomb of Hadrian, now called the Castle of Sant' Angelo. Other Roman cities, too, had streets lined with tombs, as has been shown by the excavations at Pompeii. A special type, developed in some parts of Italy, consisted of numerous niches hewn into the rock, wherein were placed all the dead of a family, or

even of a small community; these were known as catacombs. The Mohammedans made much of sepulchral architecture, taking as their favorite form the circular, domed tomb, which they modified and elaborated until it resulted in such exquisite structures as the Taj Mahal, perhaps the most beautiful building ever erected.

In the Middle Ages, burial in churches became common, and the most important tombs of the period are to be found there. These memorials were of various forms, but the favorite was a stone coffin or sarcophagus, on which rested a recumbent figure of the deceased, the whole surmounted by a canopy of great elaborateness and beauty. In modern times, tomb



Some Famous Tombs. (1) Francis I of France, at Nantes. (2) Mausolus, at Halicarnassus; from his name is derived the modern word mausoleum. (3) Beethoven, in Vienna. (4) The tomb of Napoleon Bonaparte, in the Invalides, Paris. (5) Elizabeth Barrett Browning, Florence, Italy. (6) Strauss and Brahms, in Vienna.

architecture has declined, until there is seldom seen a structure which really merits great admiration. The most impressive public monument of this kind in the United States is the tomb of General Grant, on Riverside Drive, in New York City.

Related Subjects. The reader may consult, in this connection, the following articles in these volumes:

Archaeology	Coffin
Burial	Cremation
Catacombs	Embalming

Epitaph
Immortality
Mummy
Pyramids
Sarcophagus
Taj Mahal
Towers of Silence
Westminster Abbey

For illustrations of numerous tombs of note, see the following articles:

Bonaparte, Napoleon
Grant, Ulysses S.
Italy
Lenin, Nikolai
McKinley, William
Seven Wonders of the Ancient World
Unknown Soldier
Washington, George
Wilson, Woodrow

TOMBIGBEE RIVER, a stream which rises in the northeastern corner of Mississippi, winds south and southeast through Alabama, and joins the Alabama River. These two rivers unite to form the Mobile River (which see). A considerable part of the Tombigbee's length of 450 miles is navigable. Its largest tributary is the Black Warrior. See **MOBILE, ALA.**; **ALABAMA (Rivers)**; **MISSISSIPPI (Rivers and Lakes)**.

TOMSK. See **SIBERIA**.

TOM THUMB, locomotive. See **COOPER, PETER**.

TOM THUMB. See **BARNUM, PHINEAS T.**; **DWAVE**.

TOMTIT. See **TRIMOUSE**.

TOMYRIS, a Scythian queen. See **CYRUS (The Great)**.

TON, *tun*, in the English system, a measure of weight and capacity, equal to twenty hundredweight. In Great Britain and America, a standard hundredweight is equal to 112 pounds, and the ton is therefore equal to 2,240 pounds.

In America, however, a ton of 2,000 pounds is in common use, the heavier ton being known as the *long ton*, and the lighter as the *short ton*. By United States law, a ton must contain 2,240 pounds, unless otherwise specified. United States customhouses always weigh by the long ton. Coal and iron ore are weighed and sold at the mines by the long ton, but coal is bought by consumers by the short ton. As the wholesalers lose something by waste and shrinkage in

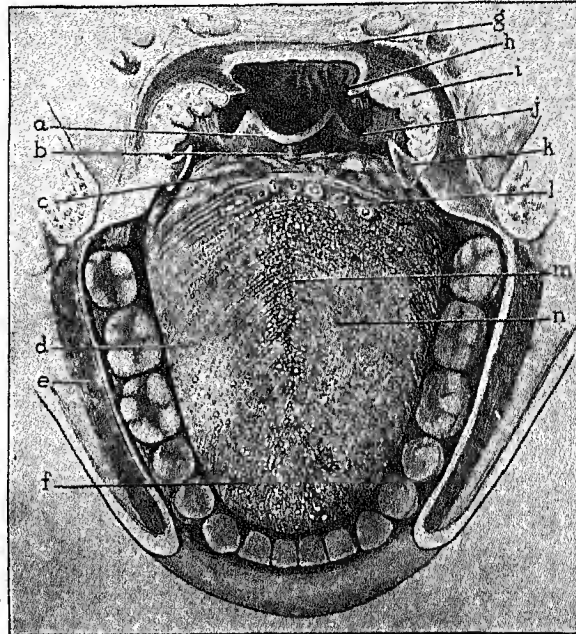
transportation and handling, this difference in ton standard practically covers the loss. See **TONNAGE**.

TONE, a musical term denoting the sound made by the vibrations of a piano, violin, harp, or other musical instrument, or by the human voice. Tones differ from one another in quality, pitch, intensity, and duration. The word *tone* is also applied in music to the larger intervals in the diatonic scale, as distinguished from the semitones, or smaller intervals. For fuller information, see **MUSIC (Common Musical Terms)**.

TONEGAWA RIVER. See **JAPAN (Waters)**.

TONGA ISLANDS. See **PACIFIC ISLANDS**.
TONGASS NATIONAL FOREST. See **ALASKA (Animal and Plant Life)**.

TONGUE, *tung*, a flat, muscular organ in the mouth, which serves as the principal organ of taste and is an important aid in the formation of sounds and in the process of chewing and swallowing. The tongue, which is composed of striped-muscle fibers, running in various directions, is attached to the hyoid bone at its root end; by virtue of this arrangement, one can move the front part in many different ways, and use it to stir the food about, push it between the teeth, collect it into small masses, and thrust it back into the passage leading to the stomach. The relation of this organ to speech is empha-



THE TONGUE

The view is that of the upper surface and surrounding anatomy.

- | | |
|--------------------------------------|-----------------------------|
| (a) Epiglottis | (h) Posterior palatine arch |
| (b) Frenulum epiglottidis | (i) Tonsil |
| (c) Pharyngeal portion | (j) Pharyngo-epiglottis |
| (d) Fungiform papilla | (k) Anterior palatine arch |
| (e) Muscle of the cheek (buccinator) | (l) Circumvallate papillae |
| (f) Fungiform papilla | (m) Roof of tongue |
| (g) Superior constrictor muscle | (n) Conical papillae |

sized in numerous proverbs which have references to the "wagging tongue," the "tongue hung at both ends," "an unruly member," etc.

The tongue is covered with mucous membrane, which, on the dorsum, or upper surface, has numerous tiny conical elevations called *papillae*. These give the organ its rough feeling. The papillae at the back of the tongue contain the taste buds. Besides muscles and taste buds, the organ has glands which secrete mucus, a moistening fluid. In ordinary health, the tongue is a pinkish red color, but when the digestion is impaired, a yellowish coating generally forms. In some diseases, it becomes a bright strawberry-red. Physicians can often tell much about the patient's condition by looking at his tongue. K.A.E.

Related Subjects.
For additional information, see the following articles:

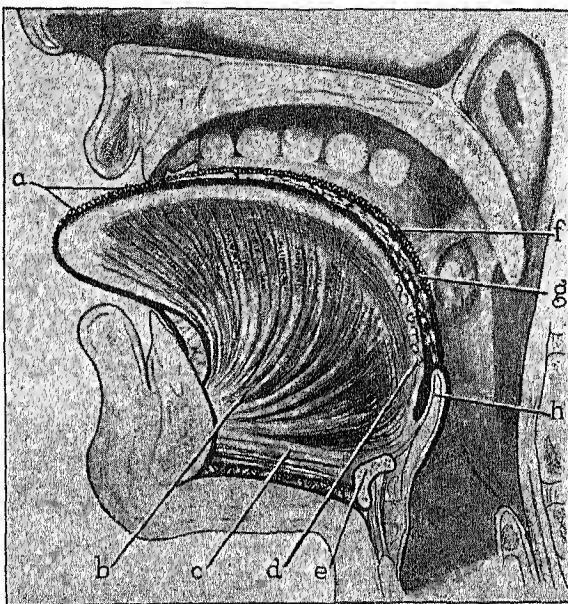
Mouth	Taste
Mucus	Voice

TONIC, *tahn'-ik*, is a word that in medicine means continuous, and is correctly applied to the constant action of muscles which maintains body temperature, keeps the limbs in place, and supports the body. A secondary and incorrect use is in the sense of medicine supposed to strengthen or tone up, that is, to stimulate, the body. Certain stimulating drugs are known to and used by the medical profession, such as digitalis for heart muscle, strychnine for nervous tissues, iron or liver for anemia, and bitter substances for the appetite. The popular idea of tonics is incorrect; there is no drug or combination of drugs that will supply or restore energy to the body, although some are useful when properly prescribed. The effect of baths (hot or cold), fresh air, exercise, massage, or even of good news, may be stimulating. Common stimulants are caffeine (found in coffee, tea, and certain soft drinks) and compounds of benzedrine, used unwisely as "pep" medicine. The use of stimulants without medical advice is unwise and may be dangerous. Many adult

persons, however, can use the ordinary caffeine-containing beverages without apparent detriment. Cod-liver oil is not a tonic; it is a food. In the true sense, there is no such thing as a tonic, as popularly conceived. W.W.B.

Related Subjects. The reader is referred to:

Baths and Bathing	Digitalis
Bitters	Life Extension
Caffeine	Medicine and Drugs
Cod-Liver Oil	Strychnine



THE TONGUE
Viewed from the side.

- | | |
|---|---------------------------|
| (a) Papillae | (e) Hyoid bone |
| (b) Flat triangular muscle (genioglossus) | (f) Taste buds |
| (c) Geniohyoid muscle | (g) Glands in soft palate |
| (d) Lymphoid follicle | (h) Epiglottis |

should happen to exceed 2,000 pounds, in which case payment is by weight. To accommodate a rapidly expanding traffic in ore, coal, and grain on the Great Lakes, American builders have produced vessels of enormous tonnage, which are capable of carrying over 16,000 gross tons.

The relation between the tonnage and the size of a ship is not easily explained, but an example may be enlightening. Thus, an ordinary cargo steamer, capable of carrying about 8,000 tons of freight, fuel, and stores, will have a displacement (weight) of 11,500 tons, a gross tonnage of about 5,200, and a net or registered tonnage of about 3,200. In the case of large, fast liners, with much space occupied by machinery, the net tonnage may be as low as fifty per cent of the gross. The tonnage of some of the world's great passenger vessels is given in the article *SHIP*.

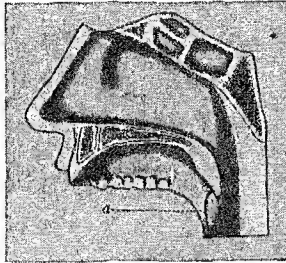
TONIC (music).

See KEY.

TONKIN. See FRENCH INDO-CHINA.

TONNAGE, *tun' ayj*, the carrying capacity of a ship, measured in cubic-feet tons. The gross tonnage contains 100 cubic feet to the ton (see the article *TON*), and this is the unit of measurement used in assessing dock and harbor dues and in fixing the fee for towing. Gross tonnage is ascertained by dividing the volume (number of cubic feet) of the interior of the ship's hull and deck houses by 100. On freighters, forty cubic feet of merchandise are regarded as a ton, unless the amount

TONSIL, *tahn' sil*, a soft, almond-shaped body lying in the back of the mouth, in front of the pharynx. There are two tonsils, one on each side of the throat. These organs seem to have no special purpose, and when they become inflamed, they are a source of pain and annoyance. Not only do diseased tonsils cause tonsillitis and quinsy (both of which see), but they are often the seat of infection from which germs may spread, producing rheumatism and other ailments. The tonsils may be removed without danger, and such removal is advisable if they are permanently affected. See EDUCATION (Hygiene of Education).



A TONSIL

The right tonsil is shown at a. The tonsils may be removed without danger, and such removal is advisable if they are permanently affected. See EDUCATION (Hygiene of Education).

TONSILLITIS, *tahn sil' lē' tis* (sometimes spelled **TONSILLITIS**), is a painful disease resulting from inflamed tonsils. It is caused by lodgment of disease germs in one or both of the tonsils. Overwork, taking cold, and dissipation are some of the predisposing causes. Attacks of tonsillitis are most common in persons between the ages of ten and forty. An attack begins with swelling and pain in the throat, and difficulty in swallowing. Fever, violent headache, backache, stiff neck, and nausea occur as symptoms in severe cases, and if an abscess forms in the throat, the attack develops into quinsy (which see).

Tonsillitis is not usually fatal, but many recurring attacks tend to make the tonsils permanently diseased, and in that case they are a source of danger to the health. Such tonsils should be removed (see **TONSIL**). Mild cases of tonsillitis usually yield to rest in bed, hot or cold compresses on the neck, and the administration of purgatives, but a serious attack should have the attention of a reliable physician.

TONSURE, *tahn' shure*, the cutting or shaving of the hair to denote dedication to clerical or monastic life. In the Roman Catholic and Greek Churches, the act is one of preparation for receiving Holy Orders, and is performed by the bishop. Clerical tonsure was mentioned as early as the fifth century, and in the Middle Ages the practice became universal. Various modes of cutting the hair were adopted in different countries; the *tonsure of Peter* left only a ring of hair around the head, as a symbol of Our Lord's crown of thorns and an emblem of the Roman priesthood; the *tonsure of James*, prevailing in Britain, consisted in shaving the front part of the head from ear to ear. This form of tonsure

was the cause of bitter strife between the followers of Saint Augustine and the monks he found in Britain, when he went on his mission to that country. In the Greek Church, formerly the whole head was shaven, but tonsure now consists in cutting the hair close.

TONTO MONUMENT. See **MONUMENTS**, NATIONAL.

TONTY, OR **TONTI**, *tohn' te*, HENRI DE (about 1650-about 1704), an Italian explorer, the trusted companion of La Salle in the exploration of the Mississippi Valley. He was born in Gaeta, Italy, but joined the French army and saw considerable service. In 1678 he accompanied La Salle to Canada, and two years later went with him on his expedition into Illinois. When Fort Crèvecoeur, near Peoria, Ill., was built, Tonty was placed in command, but after La Salle's departure his soldiers mutinied, and he retraced his route toward Canada, wintered at Green Bay, and met his leader at Michilimackinac (Mackinac Island), in the spring of 1681. Tonty was also with La Salle in his great voyage down the Mississippi River, and afterward was in charge of Fort Saint Louis, the stronghold erected at Starved Rock.

Tonty was the leader of the Illinois Indians in a campaign against the Senecas, and identified his life with that of the former tribe until 1702. In 1686 he undertook an expedition down the Mississippi to aid La Salle, but did not succeed in finding him. After 1702 he joined Iberville in Louisiana. Every report of Tonty which has been preserved speaks of him in terms of highest praise, and his influence with the Indians seems to have been as beneficial as it was strong. See **IBERVILLE**, **PIERRE LE MOYNE**; **LA SALLE**, **RENÉ R.**

TONY SARG. See **SARG**, **TONY**; **PUPPETS**.

TOOMBS, *toomz*, ROBERT (1810-1885), an American lawyer, orator, and statesman, member of the Confederate Congress and of the Confederate Cabinet, and a Southern brigadier general. He was born at Washington, Wilkes County, Ga., attended Franklin College (University of Georgia), and was graduated at Union College, Schenectady, N. Y., in 1828, and at the law school of the University of Virginia. Not long after admission to the bar, in 1830, he became one of the leading lawyers of Georgia. When the Creek Indian War broke out in Alabama, in 1836, he recruited a volunteer company and served as captain under General Winfield Scott. After serving in the Georgia legislature and the House of Representatives, he was elected to the United States Senate in 1853, and a year later ardently supported the Kansas-Nebraska Bill.

As an advocate of secession, Toombs withdrew from the Senate after Lincoln's election,

and became a member of the Confederate Congress. President Davis also made him Secretary of State, but he resigned to accept an army commission as brigadier general in the Army of Northern Virginia, and later became inspector general of a division of Georgia militia. After the war, Toombs spent two years in exile in Cuba, France, and England, returning in 1867 to Georgia, where he practiced law until his death.

TOOTHACHE TREE. See PRICKLY ASH.

TOPAZ, *toh' paz*, a lustrous mineral composed principally of aluminum, silicon, and fluorine, and occurring chiefly in granite and gneiss. It is often a valuable indicator of the presence of tin ore. In hardness it ranks between sapphire and quartz. Crystallized, transparent varieties are prized as gem stones, especially the colorless and yellow topazes. Red, blue, and green stones also are found. The best specimens of gem topaz are

taken from the Ural Mountains; they are found also in Brazil, India (including Ceylon), Maine, Colorado, and Utah. The pure-white topaz, when cut and polished, resembles the diamond; the great *Braganza diamond*, one of the Portuguese crown jewels, is probably one of these stones. The finest yellow topaz comes from Brazil; when heated, these stones turn pink, and are called *Brazilian rubies*. To the topaz the ancients attributed power to cure dimness of vision and to dispel gloom, and it is regarded as a peculiarly "lucky stone" for those born in November.

"Firm friendship is November's and she bears
True love beneath the topaz that she wears."

The so-called *oriental topaz* is a variety of corundum. See GEMS (color plate). T.B.J.

TOPEKA, *toh pe' kah*, KAN., is the state capital and the county seat of Shawnee County. It is situated on the Kansas (Kaw) River, sixty-five miles west of Kansas City, and is in the midst of the fertile Kaw Valley, near the geographical center of the United States. It is a busy commercial and industrial center, and an attractive residential city, with wide streets arched over by fine old shade trees. The State Capitol Building, a sturdy stone structure sur-

rounded by attractive park space, the Memorial Building, and the Municipal and City Building, are all located in the downtown business district. Population, 67,833 (1940).

The average elevation of Topeka and its vicinity is 1,000 feet above sea level. An adequate water supply is furnished the city through municipally owned filtration plants. Natural gas is used for all possible purposes, including domestic heat. Electric current is supplied by a 110,000-horse-power generating plant, located east of the city. There are

twenty-four parks, and about 200 miles of paved streets.

Topeka was founded in 1854 by a few antislavery settlers from the free states. Starting with nine inhabitants, it has enjoyed a steady and substantial growth. The city was incorporated in 1857, and was chosen as the state capital in 1861. It has the commission form of municipal government.

Railroads. Topeka is served by the Atchison, Topeka & Santa Fe, the Chicago, Rock Island & Pacific, the Missouri Pacific, and the Union Pacific railroads. It is the headquarters of the Santa Fe.

Industry. Over 3,800 people are employed in the general offices and shops of the Santa Fe system. The railroad shops, which are among the largest in the world, cover 215 acres, and the shop workmen number about 2,300. There are over 100 manufacturing plants, the leading industries being flour-milling, meat-packing, and printing and publishing. The iron and steel products are important; so, also, are creamery products, the city being in a rich dairy country. Coal is mined in the vicinity. Topeka has six home-owned life insurance companies.

Education. Washburn Municipal University has an enrollment of over 700 students. Mulvane Art Museum, on the Washburn campus, houses valuable permanent collections, besides traveling exhibits during the winter months. A two-million-dollar high school was completed in 1930. R.A.B.

TOPLADY, AUGUSTUS MONTAGUE (1740-1778), an English clergyman, author of one of the most popular of all hymns, *Rock of Ages* [see HYMNS AND HYMN TUNES (Ten World-Famous Hymns)]. He was born at Farnham, studied at Trinity College, Dublin, and in 1764 was ordained a priest in the Church of England. In 1768 he became rector of Broad Hembury, and this post he filled until 1775,

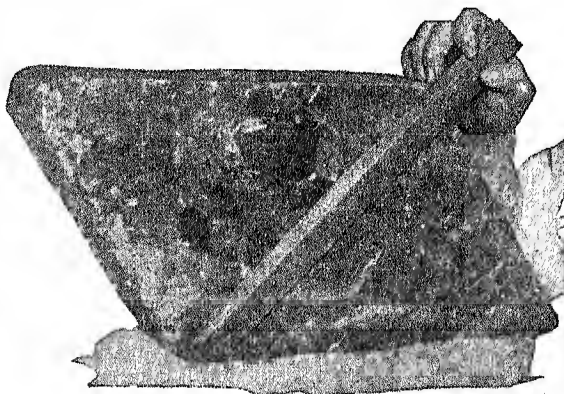
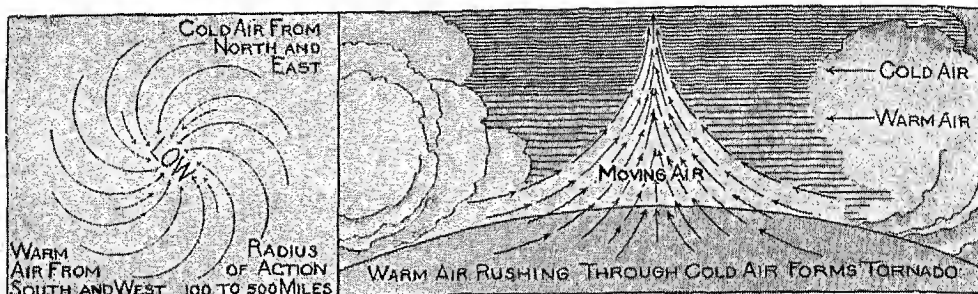


Photo: P & A

THE LARGEST TOPAZ

Found in the mines of Brazil, and now in the Smithsonian Institution, Washington, D. C. The specimen weighs ninety-five pounds, and contains 25,000 carats. Its value in the rough is about \$3,000.



HOW TORNADOES ARE FORMED

when ill health made necessary his removal to London, where he died. He wrote many controversial works, and was regarded as a champion of Calvinism, as opposed to the Methodism of Wesley.

TOPOGRAPHIC CHART. See CHART.

TOQUILLA, a fiber from which Panama hats are made. See COLOMBIA (Mining and Manufactures).

TORII, *toh' ri' e*, an entrance gateway to a Japanese Shinto temple. See SUPERSTITION.

TORINO, *toh' re' no*, the Italian name for Turin, Italy. See TURIN.

TORNADO, *taw' na' doh*, a violent whirling storm which occurs with greatest frequency in the central part of the Mississippi Valley, usually in the months of May, June, and July. Tornadoes also occur occasionally in Canada, in Australia, and in some parts of Europe. No atmospheric disturbance known is more violent than the tornado; the record of twenty-five of these storms shows that they caused a damage to property of \$15,000,000 and the loss of 1,500 lives. About 100 of these storms occur in parts of the United States annually, though not all of them cause widespread damage. In popular language, tornadoes are often called *cyclones*, but the word *cyclone*, scientifically speaking, is a term for quite a different type of storm. *Tornado* is a Spanish word meaning *twister*.

Tornadoes usually form within thunderstorms, and they occur on warm days, when the humidity of the air is excessive. The tornado cloud is a densely black, funnel-shaped mass, pointing downward from dark storm clouds in violent commotion. This funnel-shaped cloud is the storm center, and the velocity of its whirling movement is thought to be 400 or 500 miles an hour, in some cases. The condition giving rise to such a cloud may be described as a condition of unstable equilibrium in the atmosphere, with a warm layer of humid air next to earth, and a cooler layer above it. A disturbance in the atmosphere causes an upward current in the warm air, and as the current rises, a rotary movement is caused by the inrush of cold air from surrounding areas. The whirl is so rapid at the center that a

small area of low pressure is produced, the temperature is reduced, and condensation of moisture takes place; thus the cloud is formed. One often sees miniature tornadoes in open spaces on a hot afternoon, in little whirling eddies of dust. Waterspouts at sea are similar to land tornadoes.

Nearly all of these storms move in an easterly, and generally in a northeasterly, direction. They usually travel at the rate of forty or fifty miles an hour, but velocities of 100 miles per hour have been recorded. The destructive power is not in the straight wind, but in the rotating mass, which whirls counterclockwise. Though the path of the storm may be only a few rods in width, within that path buildings are torn down, trees are uprooted, heavy bridges are swept away, and locomotives are lifted from the track. Tornadoes rarely occur in regions which are mountainous to any degree, or where there is little moisture in the atmosphere. Barometric pressure in the vicinity of a tornado falls very rapidly.

The United States Weather Bureau does not forecast the occurrence of these storms, because it is impossible to predict their exact location. Meteorologists give the following advice:

If a tornado cloud is seen advancing, get into a "cyclone cellar," if there is one. In a frame house, go to the southwest corner of the basement, as such a house is likely to be removed from its foundations intact. In a brick or masonry structure, the basement is the most dangerous place, since the tornado will rip such a house to pieces and whirl the debris into the basement. R.H.W.

Related Subjects. In connection with this discussion of the tornado, the reader may consult the following articles in these volumes:

Cyclone	Typhoon
Hurricane	Waterspout
Monsoon	Whirlwind
Storms	Wind

TORNIO RIVER, a stream that forms the boundary between Sweden and Finland. It has its source in a lake of the same name, and runs a course of about 250 miles, in a general southerly direction. See SWEDEN (Rivers and Lakes).



A Tornado in Action. The ominous funnel-shaped cloud sweeps across the country, and in its narrow path leaves ruin behind. At the right, a rare picture, which shows the funnel lowering toward the ground. 7213

University of Toronto



The STORY of TORONTO

TORONTO, *toh rahn' loh*, ONT., the capital and largest city of the province, and, except Montreal, the largest city in the Dominion of Canada. It lies on the north shore of Lake Ontario, near its western end. By rail, Toronto is 334 miles southwest of Montreal and thirty-seven miles east of Hamilton. It is forty-one miles due north of the mouth of the Niagara River. Population, 667,457 (1941).

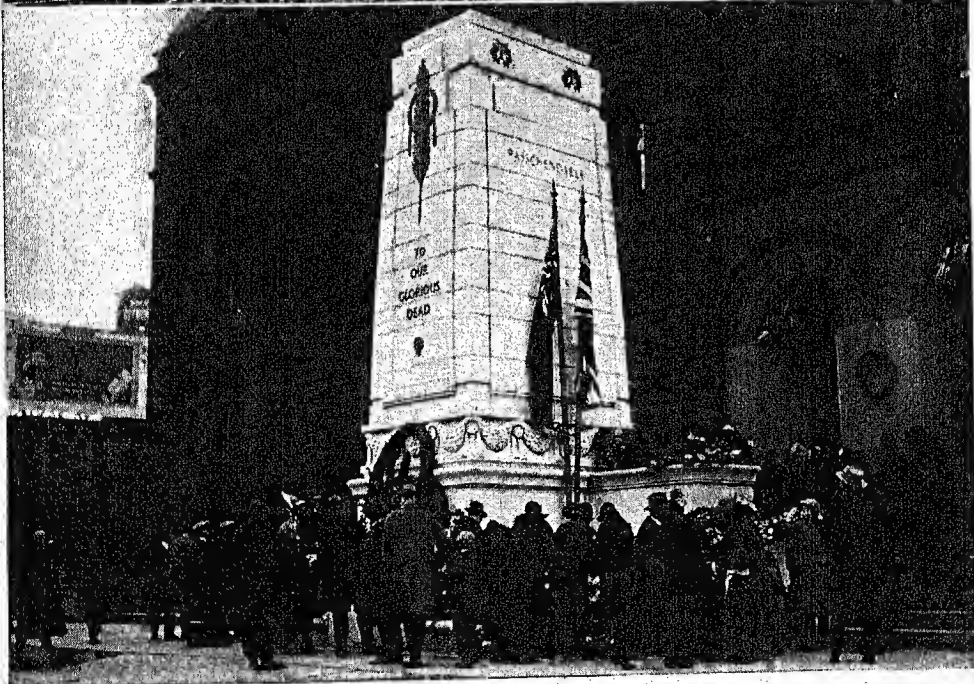
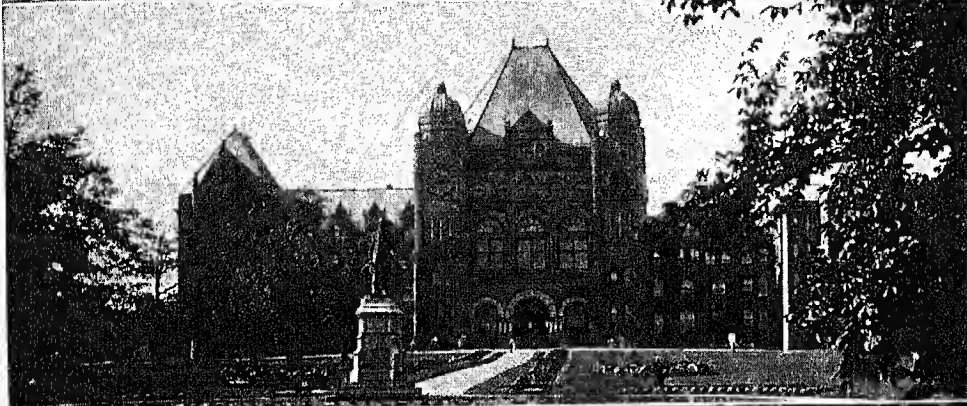
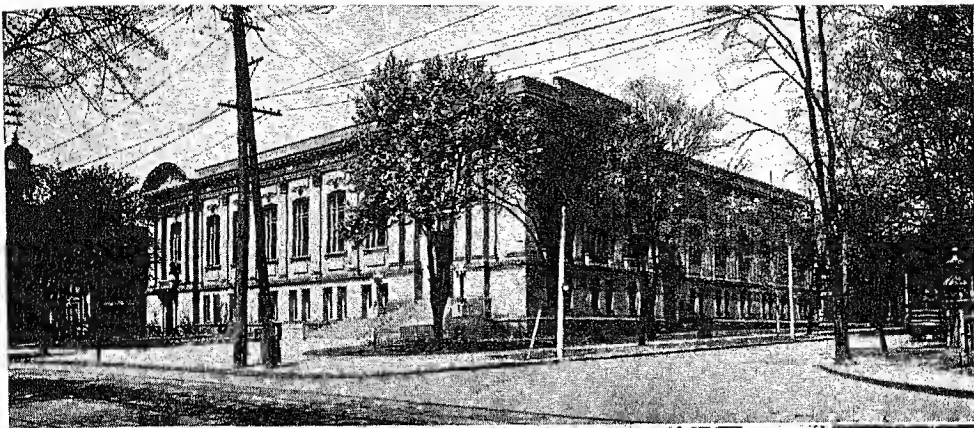
The harbor, which was originally responsible for the growth of the city, is picturesque. A sandy island, which converts the Bay of Toronto into a natural landlocked harbor, has many attractive spots, and shelters hundreds of canoes, launches, and yachts. Toronto, in fact, is noted for its aquatic sports, made possible by this natural harbor. The harbor is of tremendous commercial importance, and after the organization of the new Harbor Board, in 1911, plans were adopted for the expenditure of approximately \$24,000,000 for the purpose of improving the water front. These plans included the construction of massive sea walls and new docks, deepening of the harbor, development of a new industrial district immediately east of the harbor, and the creation of a boulevard and park system across the water front. The city is served by both the trans-continental railways of Canada.

Public Buildings and Other Features. Toronto may well boast of its public buildings. The most conspicuous downtown structure is the city hall, on Queen Street. It was completed in 1899, eight years after the laying of the cornerstone, and cost about \$2,500,000. Its massive tower, 300 feet high, holds a clock which is said to be the largest winding clock in North America. Near it is the impressive Osgoode Hall, the seat of the law courts. First in importance of all the city's buildings, is the Parliament House, in Queen's Park, beautifully situated in the same park which houses the imposing buildings of the University of Toronto, the pride of the city. Union Station was completed in 1927. There are 103 parks and playgrounds with an area of 2,361 acres.

Commerce and Industry. Toronto is Ontario's chief commercial center. The city is the leading wholesale jobbing center in the Dominion, its trade in dry goods and shoes being especially noteworthy. Some of these goods are imported from the United States, but the largest part are made in Canada. The city is an insurance exchange, and its bank clearings and debits exceed those of any city in the Dominion. It is noted for its department stores, two of which are the largest of their kind in the British Empire.

In manufactures, Toronto ranks first. It has more than 3,000 manufacturing establishments, its yearly output being about one eighth of Canada's total. It is the great slaughtering and packing center of Canada, and it has a large output of tires and other rubber products, biscuits, confectionery, hosiery and knitted goods, clothing, printing and bookbinding, electrical equipment, medicinal preparations, paints, soaps, machinery, lumber, and various iron and steel products, including stoves. The shipbuilding yards are also important. The city's largest establishments make agricultural and other machinery. Power for all these plants is derived entirely from Niagara Falls, through the management of the Ontario Hydro-electric Commission. Light and heat for the city are obtained from the same source. In 1940 there were 269 miles of track over which about 168,147,000 passengers were carried.

Institution. With one church for approximately every 1,800 of the total population, Toronto is often called "the city of churches." There are two cathedrals—Saint James (Anglican), and Saint Michael's (Roman Catholic). The city is the educational center of the Dominion. In fact, the city's most conspicuous buildings are those of the University of Toronto and its colleges of Victoria, Trinity, and Saint Michael's, Hart House, one of the finest students' unions on the continent, Upper Canada College, the oldest secondary school in the Dominion, and a number of schools for girls, Bishop Strachan, Havergal, and Brank-



In Ontario's Capital City. At top, Toronto public library. Center, provincial House of Parliament, with Queen's Park in the foreground. Below, Toronto's cenotaph, erected in memory of Ontario's dead in the World War.

7215



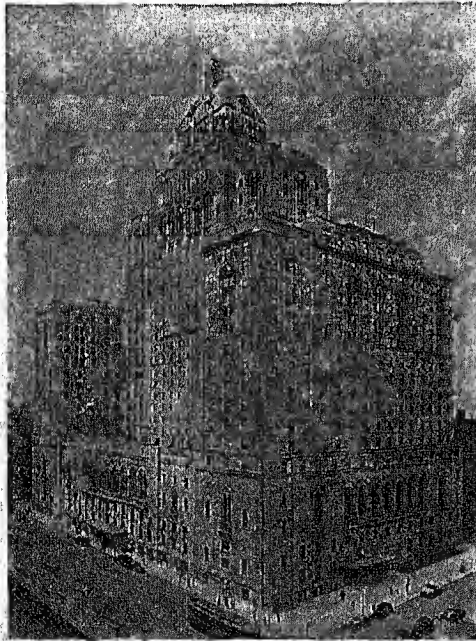
some. The Central Technical School, for boys, is one of the best-equipped schools on the continent. The public library, the largest in the Dominion, with its nineteen branches, many of them in beautiful buildings, has a prominent part in the education of the people, and there are about 160 public and technical schools.

Toronto is also the Canadian center for education in the arts. It is the home of the Ontario Society of Artists and has a well-planned art gallery, a flourishing art school, and a large number of musical schools.

There are seventy-two hospitals, asylums, and other benevolent institutions, the largest being the Toronto General Hospital.

Toronto has the Canadian National Exhibition which is held in permanent buildings in a beautiful park on the lake shore for a fortnight in early September and is visited by about two million people.

History. The name *Toronto* is of Indian origin. It means *a place of meeting*, and was probably given to the site because it was a rendezvous for Indian councils or war parties, long before the coming of the white man. It was then the end of the shortest and most convenient route between Lake Huron and Lake Ontario. During the seventeenth and



ROYAL YORK HOTEL, THE LARGEST IN THE EMPIRE

eighteenth centuries, the history of Canada was the record of a struggle between the French and the British for the fur trade. The French control of the Niagara River route led the English to establish Fort Oswego, which was to attract trade from the Northwest.

The French countered by building Fort Rouille, in 1749 or 1750, on the site of Toronto. In 1793 the fort was destroyed, to prevent its use by the English.

Finally, in 1794, Governor Simcoe chose the

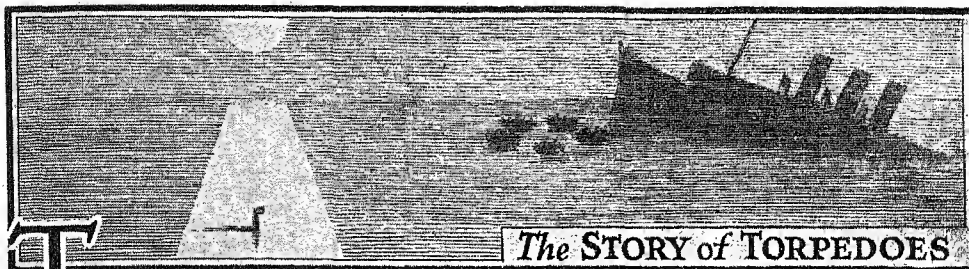


THE CITY HALL, TORONTO

site for the capital of Upper Canada, and named the new settlement York. It was captured by the Americans in 1813, and some of its public buildings, including the archives, were burned. In 1834, having a population of 10,000, York was incorporated as a city, and its name changed back to the original Indian name, Toronto. The city government is vested in a council consisting of a mayor and four controllers, who are elected annually, and eighteen aldermen. Education is under the control of an elected board. G.H.L.

TORPEDO, OR ELECTRIC RAY, a ray found in warm seas, so called because it can apparently discharge electricity from special organs lying in the head and gill region. Its body is flat and broad, dark above and white below, and ends in a slender tail. The torpedo uses its strange power to kill small fish for food; in a full-grown, healthy fish, the shock is powerful enough to disable a man. After discharging electricity, the fish is temporarily exhausted. The exact way in which the electric organs become charged is not well understood. See ELECTRICAL FISH. L.H.

Scientific Name. The torpedo of the North Atlantic coast, known also as the cramp fish, is *Tetronarce occidentalis*.



The STORY of TORPEDOES

TORPEDO, an underwater weapon used in naval warfare for the purpose of destroying enemy vessels. Its name is derived from the Latin *torpere*, meaning to be asleep or numb, and was adopted possibly by analogy with the *torpedo* fish, or electric ray, which is capable of giving a severe shock. In several wars, within recent years, the effectiveness of torpedoes has been demonstrated, but never before with such dreadful and deadly certainty as in the World War. It was one of the cruelest weapons of that war, and to meet the demands for an instrument of the highest efficiency, it was improved within two years by the German naval establishment from a comparatively small, though powerful, device to an undersea terror weighing a ton and a half. In its evolution, the cost of the torpedo rose from about \$3,000 to over \$8,000 for the largest sizes. When considered from the viewpoint of dimensions, it is the most complicated and the costliest piece of mechanism ever devised to kill men and to destroy property.

The Wonders of the Invention. The inventive genius of man would seem to have reached the apex of achievement in the torpedo of the present day.

It can be set to run at any desired depth up to thirty or thirty-five feet, and can travel at the speed of a passenger train, which requires a powerful engine, intricate in detail. Its running depth is set by varying the initial tension of a spring, which works against a hydrostatic piston to operate horizontal rudders and keep the torpedo at the depth corresponding to the set load on the spring.

The torpedo must also be capable of keeping a straight course. This is accomplished by a gyroscope, which will operate a vertical rudder to bring it back to its original course if deflected. In the head of the torpedo there is an explosive charge powerful enough to tear a hole in the side of a vessel. By means of these mechanisms a modern torpedo runs at high speed under water, on a straight course, and stabilizes itself at the desired depth, all without being touched after launching.

The first torpedo which successfully steered itself in both depths and deflection was the Whitehead type, using a reciprocating engine. The Bliss type, developed later and equipped

with gas turbines is still used by some navies, including the United States; but the Whitehead is in more general use. The latest types are about twenty-one inches in diameter and over twenty feet long. In appearance, the torpedo is a long cylinder with a hemispherical nose and a tapered afterbody in which the engine is housed. It has a tail carrying two contrarotating propellers on concentric shafts, and the horizontal and vertical rudders are secured to the after-edges of stabilizing vanes.

How It Is Operated. Most torpedoes use compressed air, with which is mixed and burned a hydrocarbon fuel such as alcohol or kerosene. Water is then added and converted to steam to prevent destructive temperatures. Some torpedoes have been equipped with electric batteries which drive motors, although this type is inferior to the air-steam type in speed and distance traveled.

At the front of the torpedo is the war head, a thin shell containing as much as 500 pounds of a high explosive, usually T.N.T. (trinitrotoluene or trinitrotoluol). Upon contact of the forward end of the torpedo with a massive object, a mechanism in the nose explodes the charge. For practice firing this war head is replaced with an exercise head containing water, the water being expelled at the end of the run to give added buoyancy, thereby insuring recovery of these expensive weapons when fired in target practice.

Back of the war head is a steel cylinder containing from 3,000 to 4,000 cubic feet of free air compressed to high pressure. In the after end of this cylinder are also carried the fuel and the water required for the run. In an electrically propelled torpedo this entire cylinder is relatively thin-walled and carries a storage battery. The next chamber carries the engine (reciprocating engine, turbine, or electric motor) which drives the propellers. This chamber is opened to the sea, to admit cooling water to the engine.

The rear compartment is tapered aft and contains the gyroscope, the depth control mechanism, and the small steering engines which move the horizontal and vertical rudders. In the air-steam torpedo the exhaust gases and steam escape through the hollow propeller shafts into the water. The steam is instantly condensed, but the air causes bubbles, making the wake of

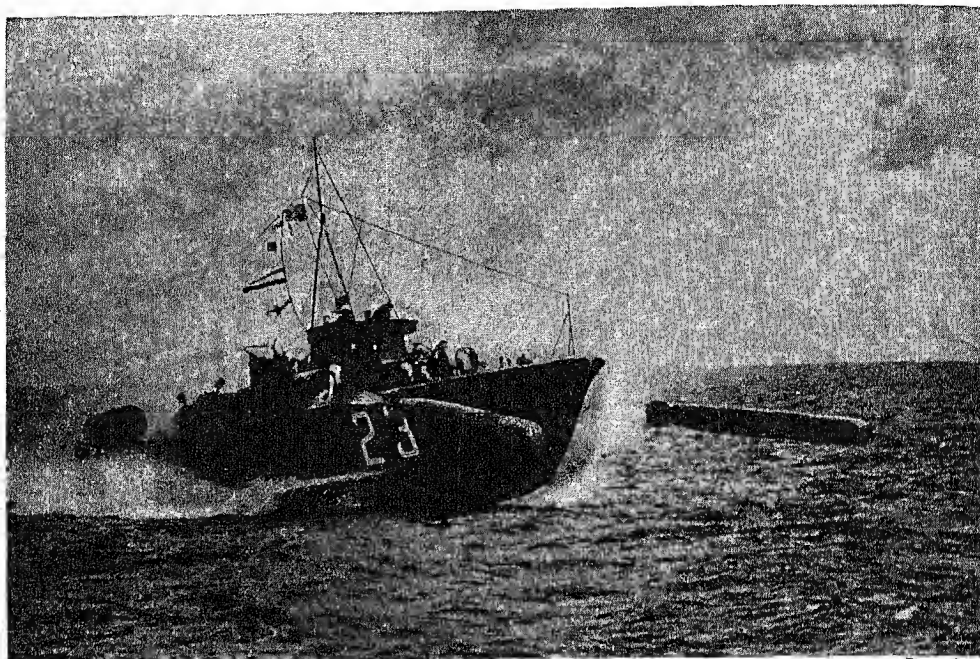


Photo: Aoma

A TORPEDO BOAT IN ACTION IN WORLD WAR II

By means of compressed air, two torpedoes are being released from this small, but swift, British war craft. Because of their small size and shallow draft, Britain's torpedo boats, making up her so-called "mosquito fleet," are chiefly used in coastal waters and small seas, where they attack merchantmen, men-of-war, and submarines.

the air-steam torpedo discernible. The electric torpedo has the advantage of leaving no visible wake.

The torpedo may be fired from a tube located below or above the water line, or launched from an airplane flying at low altitude. Compressed air is used to expel it from a submerged tube, and gunpowder or cordite to launch it from a tube above water. It takes its set depth immediately and starts its run.

The most powerful torpedo can travel about six miles at a speed in excess of thirty miles per hour. If adjusted for a shorter distance, it can make as much as forty miles per hour. Submarines attempt to attack from very short distances, and, therefore, torpedoes with high speeds are desirable for them.

Historical. In 1585 an Italian engineer blew up an enemy's bridge at Antwerp by floating down the Scheldt a small vessel loaded with powder, which was exploded by clockwork mechanism. The next recorded experiment was nearly 150 years later, when a Frenchman exploded under water several rockets bearing heavy charges of powder, and destroyed two small vessels. An American, David Bushnell, was the first man to devise a torpedo which could be called the forerunner of the present type.

It was found necessary to attach it to the vessel to be blown up, and this necessitated a

so-called submarine torpedo boat—not a vessel of the present submarine type, however, but a globular affair, holding one man, and intended only as a device to put the operator in close proximity to the vessel to which the torpedo was to be attached. It was a clumsy expedient, and very dangerous to the operator. Robert Fulton in 1805 also demonstrated a method of destroying ships by exploding a charge of gunpowder against the hull under water. He also called the charge a torpedo.

The first of the modern torpedoes intended to be projected through the water carried no engine. They were tapered wooden contrivances with an explosive head, and were shot at their target at not over one-fourth of a mile. This early weapon called for small, fleet vessels which could get close to the enemy without detection, and thus the torpedo boat of the last quarter of the nineteenth century was called into existence. The torpedo-boat destroyer was next evolved, to cope with the torpedo boat. Today, the submarine and destroyer constitute the principal torpedo offensive; and in some countries even the battleships and cruisers are equipped with torpedo tubes. See SUBMARINE, illustrations.

The present Whitehead torpedo was invented in 1864 by Robert Whitehead, a Scottish engineer who was then manager of an engineering factory in Fiume. He perfected a self-

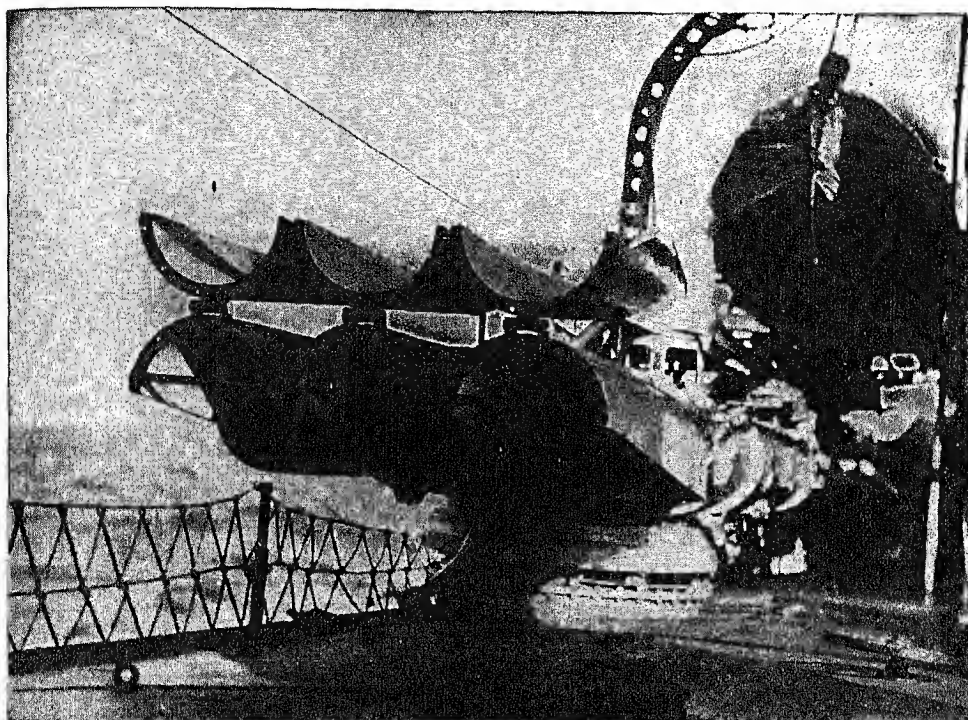


Photo: Photograms

HOW TORPEDO TUBES ARE PLACED ON THE DECK OF A SHIP

propelling, floating torpedo designed by an officer of the Austrian navy. See **TORPEDO BOAT**; **WORLD WAR I** (Submarines in the War); and **WORLD WAR II**. R.B.L.

TORPEDO BOAT, a small high-speed vessel equipped to carry torpedoes as its principal weapon of attack, and relying upon its speed and maneuverability for protection. The purpose of such a vessel is to make hit-and-run attacks at very high speed, darting in and out of enemy harbors or against the enemy fleet, taking advantage of smoke screens, fog, or darkness if possible.

The first torpedo boats were much larger than the ones of today and were of steel construction. The destroyer, evolved to combat them, possessed a greatly superior speed and proved an easy match for them. The present type had been in use by the British, French, Italians, and Germans for many years when the United States first adopted them in 1940. In fact, the first ones to be constructed were an adaption of the latest British type designed by Hubert Scott-Paine, and are termed *patrol torpedo boats* (PTs).

They are constructed primarily of lightweight materials such as plywood and aluminum, reinforced as necessary, and with their power plant of three 1,500 horsepower engines they can skim along at better than fifty-two knots (60 m.p.h.) or cruise over 3,000 miles.

Fifty to eighty-one feet in length, they can carry four torpedoes and are readily adapted for carrying depth charges. They are manned by a crew of nine men, including one officer, the age limit of these men being fixed at thirty-five in view of the terrible strain and hardship of forcing the craft at high speed in any kind of weather.

After the United States entered World War II, the torpedo boats comprising its *mosquito fleet* played an important part in raiding Japanese shipping and in guarding bases established in the Solomons and Aleutians. Even the battleship was vulnerable when opposed by these sea commandos. They covered their own length in less than a second, darting in to the attack and withdrawing while presenting a target almost impossible to hit. R.B.L.

See also **TORPEDO**; **WORLD WAR I, II**.

TORQUE. See **AUTOMOBILE** (Construction and Operation).

TORQUEMADA, *lohr kay mah' thah*, TOMAS DE (1420-1498), the first inquisitor-general of Spain. He was born at Valladolid, and became a friar preacher in the Dominican monastery in that city. For twenty-two years, he was prior of the monastery of Santa Cruz, at Segovia, and was confessor to Isabella, afterward queen of Spain. In 1478 the Inquisition was established in Spain; Torquemada, through the aid of Ferdinand and Isabella,

was made assistant to the inquisitors, and in 1483 was named inquisitor-general over all Spanish possessions.

Not only for religious reasons, but for political considerations also, he was extremely zealous, for he felt that the suppression of heretics was the only way to bring about the political unity of Spain. He was inquisitor-general for eighteen years, and during that time sentenced to death at the stake over 10,000 persons. His severity was rebuked by the Pope, and he had frequently to send embassies to Rome to defend his methods. He took part in the expulsion of the Moors from Spain, and was largely instrumental in driving the Jews from the country. The Jews, numbering 800,000 at the lowest estimate, had been the most flourishing commercial class of Spain, and the loss to the country was inestimable. Torquemada was intensely unpopular, and never dared appear in public without a strong guard. He finally retired into a Dominican monastery at Avila, where he died, leaving a name that, to this day, typifies wanton cruelty.

TORRENS SYSTEM, a system of registering titles to real estate, devised by Sir Robert Torrens, who introduced it in South Australia in 1858, when he was premier and treasurer of the colony. The system rapidly gained favor in the other colonies, and by 1874 was in use in each of the colonies of Australia, in Tasmania, and in New Zealand. It has since been introduced into Canada and other British possessions, the United States, and many of the countries of Europe. The purpose of the system is twofold:

- (1) To make the transfer of landed property as simple and safe as that of other property.
- (2) To do away with the repeated examination of titles.

The system is operated through a bureau or court of registration in charge of a registrar, with whom, in most cases, is associated an examiner of titles. In brief, it substitutes public registration for conveyancing.

Getting the First Torrens Title. The first step toward having one's land registered consists in filing with the registrar a petition for registration. With the petition, the applicant must file all records in his possession relating to the title. He must also give in writing under oath a statement of all encumbrances; that is, of debts secured by mortgage or liens, and of all delinquent taxes. These papers are referred to the examiner of titles, who proceeds to verify them. If other persons are interested in the property, by marriage or otherwise, the law requires the registrar to notify them of the petition and give them an opportunity for a hearing. In short, everything possible is done to learn all the facts bearing upon the title

under consideration. When this work is completed, the examiner of titles makes his report to the registrar.

The Certificate. If the registrar is satisfied that the title is perfect, he files away all the old papers and issues a certificate, which declares that the land is the property of the registered owner, subject only to the encumbrances described on the certificate. The certificate must be signed by the registrar. It is issued in duplicate, the official copy being filed in the office of the registrar, and the other being given to the owner. The official certificate becomes the title of ownership and is *indefeasible*; that is, it cannot be set aside or overcome. In case of transfer of the property, no further examination of the title is necessary, but it is always wise to inquire of the registrar whether any notices of encumbrances have been received and not registered. The first certificate is canceled and a new one issued, and this completes the transaction.

Insurance Fund. In case an interest in the property is found, or a just claim to it arises which was not discovered at the time the certificate was issued, the holder cannot be dispossessed of the property; but the holder of such an interest or claim may be paid from a fund created for that purpose by a small assessment on the property at the time of each registration. The rate varies in different states and countries, but it is usually one-tenth of one per cent on the valuation.

United States. The first Torrens Act in the United States was passed by the legislature of Illinois in 1895. The act was declared unconstitutional by the supreme court of the state, because it conferred judicial powers upon the registrar and examiner of titles. In 1897 another law was passed, without these objectionable features. From time to time, the system has been introduced into other states, but the progress has been slow, owing to the complicated systems in the older states, which seem difficult to replace. Since each state has its own system of registering titles, the Torrens acts vary in different states as to minor points, but they are uniform respecting their main features.

In Canada. A system of land registration based upon the Torrens system was adopted by Vancouver Island in 1861. When Vancouver became a part of British Columbia, in 1866, this system was continued over the entire province. The system is the only one used in Alberta and Saskatchewan, and is in very general use in Manitoba; it went into effect in Nova Scotia in 1907. The Ontario law adopted in 1885 is based on the English Land Act of 1875, and provides for three grades of certificates—absolute, qualified, and possessory. See **TITLE; DEED.**

TORRICELLI, *tahr re chel' le*, EVANGELISTA (1608-1647), an Italian scientist, famous

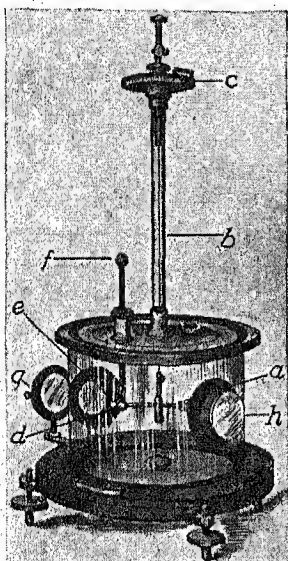
for his discovery of the principle of the barometer. (For explanation and illustration of this law, see BAROMETER.) Torricelli was Galileo's assistant during the last three months of the philosopher's career, and on Galileo's death he succeeded him as professor of philosophy and mathematics in the Florentine Academy. He improved the microscope and telescope, and made several important discoveries in mathematics and physics. See GALILEO; AIR.

TORRID ZONE. See TROPICS; ZONE.

TORRINGTON, CONN. See CONNECTICUT (back of map).

TORSION, *tawr' shun*, **BALANCE**, an instrument for measuring very small forces. It consists of a horizontal bar, suspended by a thread of silk or other substance, so that it will balance. Threads of quartz are very generally used for the purpose.

In the illustration, *a* is the bar, *b* the thread. The upper end of the thread is attached to a graduated head, *c*, by whose rotation the intensity of the force is measured. The operation of this balance may be illustrated in the measurement of an electric charge. The two balls, *d* at the end of the bar, and *e* at the end of the rod *f*, are in the position shown in the illustration, and the pointer on the graduated disc is at *o*. The balls are then charged, and the electricity forces them apart. By looking through the telescope, *h*, one may see their divergence in the mirror, *g*. The graduated head is then turned until the torsion (twisting) of the thread is sufficient to bring the balls to their former position. By previous testing, the force exerted upon the thread by a complete rotation of the graduated head is known, so that the force exerted by any number of degrees may be readily determined. See GALVANOMETER.



TORSION BALANCE

Explanation of the figure appears in the text.

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A.L.F.

TORSIONAL STRESS. See STRENGTH OF MATERIALS.

TORT, *tawrt*, has been defined by various authorities as a private or civil wrong or injury, independent of contract; a breach of a

legal duty; and a violation of anyone's right to personal security, to liberty, to property, or to reputation. The shortest and commonest definition is "a civil wrong." A tort differs from a crime in that the latter is an offense against the state, and not the individual.

Torts is the term used to designate the branch of law which treats of the redress of injuries not classified as crimes or as breaches of contract. In this branch are included slander, libel, trespass, alienation of affection, nuisance, and negligence.

The chief distinction between a tort and a breach of contract is that the former involves a greater degree of moral guilt, though there are cases in which action could be brought on either ground. For example, a person who buys a ticket of a railroad virtually enters into a contract with the road, whereby he is guaranteed a certain amount of safety. If one of its employees attacks him, the injured passenger can sue for damages on the ground of assault (an action in tort), and also for breach of contract for transportation.

Derivation. The word *tort* is derived from the Latin *torquere*, meaning to twist, or wrest aside.

Related Subjects. In connection with this subject, the reader may consult the following articles in these volumes:

Assault and Battery	Negligence
Contract	Nuisance
Crime	Slander
Libel	Trespass

TORTICOLLIS, *tawr tih kahl' is*, wryneck, stiffneck. See RHEUMATISM.

TORTILLA, *tahr teel' yah*. See BREAD (What Bread Is); MEXICO (Foods).

TORTOISE, *tawr' tus*. See TURTLE (Tortoises of the Land).

TORTOISE SHELL. See TURTLE, subhead.

TORTURE, *tawr' ture*, the infliction of severe physical pain by the use of the rack, scourge, stake, or other instruments and devices, as a punishment for crime, for the purpose of revenge, or to compel confession or the giving of evidence in judicial proceedings. The American Indians and other primitive peoples were accustomed to inflict torture on captured enemies, but civilized nations as well, in the past, have not scrupled to make use of this practice, both in religious and in civil procedure. In Greece, slaves were examined under torture; under the Roman Empire, it was also inflicted upon freemen. In Europe, in the Middle Ages, torture was commonly resorted to by Church and State to procure confessions of guilt and to punish offenders, and among its victims were such men as Savonarola and John Huss.

By the sixteenth century, public sentiment had been generally aroused against the practice, but it lingered in various sections of Europe until the early part of the nineteenth century; and even as late as the Russian

revolution of 1917, flogging with the knout was the lot of Siberian exiles. Its use in Catholic countries was prohibited in 1816 by a Papal bull. The various devices and methods that have been employed by torturers are numerous and complicated, and it would seem that human ingenuity could have gone no further in devising ways of inflicting bodily misery. For a peculiar method of deciding the guilt or innocence of an accused by torture, see ORDEAL AND COMBAT, TRIAL BY.

TORY, from the end of the seventeenth century until about 1832, the name of one of the two great political parties in Great Britain. The word is said to be derived from the Irish *Tar a Ri*, "Come, O King!" a call familiar to the Irish loyalists who fought for King Charles I. Under the Commonwealth, almost any kind of a bandit or outlaw was a Tory, and after the Revolution of 1688, the term was freely applied to the Irishmen who waged a guerrilla warfare on behalf of King James II. "Tory" was about the most offensive epithet in the vocabulary of an English Protestant.

Meanwhile, the word was used in a political sense, one which is more familiar. After the Restoration, there was a "country party" and a "court party," but in 1679, when Charles II was in the midst of his quarrels with Parliament, these parties called each other the worst names they could think of—Whigs and Tories. To call a man a Tory was to class him with the Irish outlaws, and the term was used in derision of the members of the court party, who refused to support the bill for the exclusion of the Duke of York, later James II, from succession to the throne because he was a Catholic. In time, the origin of these words was ignored, and they became the official party titles.

During the eighteenth century, the Tory party included most of the small landowners and the clergy, while the Whigs were the landed aristocracy and the merchants and small tradespeople. Under George III, the Tories managed to curb the power of the great Whig landowners, who had controlled Parliament through "rotten" or "pocket" boroughs. They now naturally relied on the power of the Crown and, through the influence of the younger Pitt, added the principle of reliance on the people. The French Revolution upset this arrangement. The new democracy, which quickly spread to England, was opposed by the landed interests as well as the king, and the ranks of the Tories soon included most of the former Whig landlords. The Whigs now became the party of progress (see **WHIG**), while the Tories, in spite of Pitt's efforts, became identified in the minds of the people with the general principle that the existing state of affairs was satisfactory. After the Whigs secured the passage of the Reform Bill of 1832, the Tories ceased to be a power and the use of the name gradually de-

clined, but their place is practically filled by the Conservative party of the present time, who are still sometimes called Tories by their opponents.

In the American colonies, before and during the Revolution, any person who was known to have, or was suspected of having, loyalist sympathies was called a Tory by the colonists who favored independence. See **CONSERVATIVE**; **WHIG**.

TOSCA, *LA, tahs' kah, lah*. See **OPERA** (Some of the Famous Operas).

TOSCANELLI, a geographer of the Middle Ages. See **GEOGRAPHY** (The Age of Discovery).

TOSCANINI, **ARTURO** (1867-), Italian musician, received his early music education in Parma, his birthplace. He made his debut as conductor at Rio de Janeiro, in 1886, subsequently serving at La Scala, in Milan, for many years prior to his initial appearance at the Metropolitan in 1908. From 1926 to 1936 he was with the New York Philharmonic-Symphony Orchestra, meanwhile conducting at several European summer festivals. After a short retirement, he organized and became conductor of the National Broadcasting Company Symphony Orchestra, in 1937. Throughout his career he conducted from memory.

TOSKS. See **ALBANIA** (The People).

TOSTIG. See **HAROLD** (III, Norway).

TOTEM, *toh' tem*, among primitive peoples, an object regarded as the symbol of a tribe, clan, family, or individual. The totem may be a bird, fish, beast, or any other object. Sometimes the totem is looked upon as the tribal object of worship.

The practice of carving totem figures on poles is common to many North American Indian tribes, especially to those of the Pacific Coast.

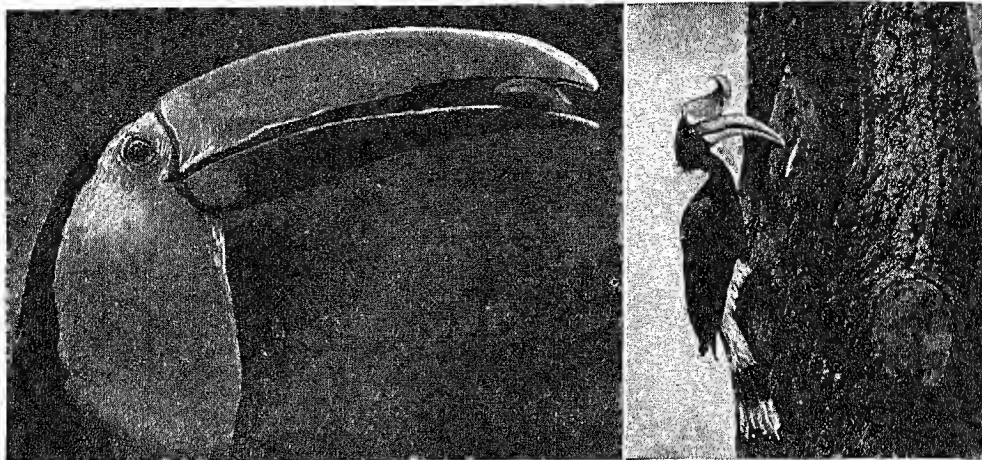
Stories of local happenings and records of Indian wars were emblematically depicted on some of the larger poles, and elaborate ceremonies accompanied their raising. Excesses in connection with these celebrations sometimes involved human sacrifices, and finally led to governmental opposition to the rites. An exceptionally fine specimen of a totem pole, donated to Lincoln Park, Chicago, was erected there in 1929.

TOUCAN, *too kahm'*, a bird of tropical and semitropical America, which has an enormous beak, a thick, short body, and short legs. The upper mandible is curved over the lower and is notched at the edges. In a tropical species of Brazil and Guiana, the beak is eight inches long and three inches high at the base. The tongue, also, is curiously flattened and notched, and the bird's tail is joined to its body by a ball-and-socket joint, which permits of its being raised above its back with a jerk, as if operated by a stiff spring. Toucans are brilliantly colored; their black or green bodies are marked with red, orange, white, or blue,



Photos: U & U; OROO

Totem Poles. A famous totem at Wrangell, Alaska. The house belongs to an Indian family; the circular window is supposed to represent the sun, and is expected to bring good fortune. The totem in the inset is in a public park in Victoria, B. C.



Photos: Wide World; Visual Education Service

THE TOUCAN

At left, head and bill of one of these birds in the London (England) zoo; photographed in the act of eating a delicate morsel. At right, a horned species of Guiana. See BIRDS (color plate, Birds of the Tropics).

and the beaks are crossed with vivid bands. They feed on fruit, small birds, lizards, and other animals, and are often destructive to orange plantations. Their eggs, pure white in color, are deposited in holes in trees. In the Andes, they are found at an altitude of 10,000 feet.

D.L.

Classification. Toucans belong to the family *Rhamphastidae*. The typical species are placed in the genus *Rhamphastos*.

TOUCH, one of the five special, or exterior, senses, the one which gives to the individual his most intimate knowledge of objects in the world about him. He may judge the color and general shape of an object by looking at it, but he can learn just how rough, or how sharp, or how soft it is, only by feeling it. This tactile sense is perceived through the stimulation of sensory nerves which have their end-organs in the skin and the mucous membranes.

It is believed by modern physiologists that the tactile sense cannot be perceived alone, but that the same nerves which transmit this sensation also give us our sensations of warmth, cold, and pain. As is known from common experience, slight pressure can be increased until the original sense of touch becomes definitely a sensation of pain.

The delicacy of the sense varies in different parts of the body. This is due to the fact that the end-organs for the perception of this sense are not distributed evenly over the body, but are scattered rather unevenly in clusters. Where there are the greatest number of end-organs, the sense of pressure will be most accurate. It is most highly developed on the tip of the tongue, and least developed on the back of the shoulders. The tips of the fingers and end of the nose are other sensitive

areas. In such regions, the end-organs are very numerous. Scientists measure the acuteness of this sense by using an instrument having two needle points operated like the points of a compass. In a section of great sensitiveness, these two points can be separately felt when but a fraction of an inch apart. The distance at the tip of the tongue is 1.1 millimeters (about $\frac{1}{25}$ inch), as compared with 66 millimeters (about 2.6 inches) on the back of the shoulders.

The end-organs for the perception of warmth, cold, and pain have the same uneven distribution over the skin that is described for those of touch. One may discover this for himself by running some pointed metal instrument over his skin. The instrument will be colder than the skin, but it will be noticed that at some points it will feel cold, and at others it will simply be felt as pressure.

Authorities have located 30,000 spots on the skin of the trunk and limbs, from which the sense of warmth is conveyed to the brain, and over 200,000 "cold spots" have been identified. The importance of developing the tactile sense is recognized by modern educators, and touch exercises have a place in all kindergarten and Montessori schools. In the acquisition of knowledge, touch is as important as sight. It was through the training of this sense that Helen Keller, blind and deaf from infancy, learned to read, write, and speak, and join in world activities.

K.A.E.

[See SENSES, SPECIAL, and the list of related subjects there given.]

TOULON, *too lawN'*. See FRANCE (Interesting Cities).

TOULOUSE, *too looz'*. See FRANCE (Interesting Cities).



A TOURNAMENT OF MEDIEVAL DAYS

TOUR, COGNIARD DE LA (1777-1859). See YEAST.

TOURMALINE, *toor' ma lin*, a common and beautiful mineral, which crystallizes in the hexagonal system and is found chiefly in granite, gneiss, and mica schist. The mineral is harder than quartz and will easily scratch glass, but its exact constitution has not been determined by scientists. There are three types of tourmaline, differentiated according to the oxides present—the black, or iron, tourmalines; the brown, or magnesia; and the alkali tourmalines of rich reds, greens, and blues. The latter sometimes occur as beautiful, transparent gems. Pink and red tourmaline gems are known as *rubellite*, or *Siberian ruby*; the colorless, as *achroite*; and the blue and green stones as *indicolite*, or *Brazilian sapphire*. Often, in the same crystal, there will be two or more contrasting colors, either sharply distinct or blended, and frequently the color differs as the light strikes the prism lengthwise or crosswise. The optical properties of tourmaline are, in fact, of exceptional interest, a ray of light entering a crystal being split up into two rays.

Bright-colored tourmalines occur in San Diego and Riverside counties, Calif.; the mines in these regions were exploited to meet the expected demands of the Panama-Pacific and San Diego expositions, in 1915. Blue and green stones are found in gem pockets in the quarries of feldspar and other rocks in Con-

necticut, Maine, Massachusetts, and New Jersey; and black and brown crystals are found in New York quarries. The Ural Mountains, the island of Elba, Brazil, Maine (in the vicinity of Paris), Siberia, and Ceylon are famous for bright-colored tourmalines, and much of the achroite also comes from Elba. Blue varieties are found in Sweden, and the black stones occur in Norway, England, Greenland, and the Tyrol. Gem tourmalines are also found in Madagascar.

The interesting physical properties of this mineral have made it useful as well as ornamental. By heating and friction, it is rendered highly electric, and it is valuable as a conductor. Transparent tourmaline is also one of the few substances which obstruct some of the vibrations of light, a condition that produces polarization of light. For a full explanation of this phenomenon, see **POLARISCOPE** and **POLARIZATION OF LIGHT**. With the opal, tourmaline is a birthstone for October (see **BIRTH-STONES**). See, also, **CRYSTALLIZATION**.

TOURNAMENT, or **TOURNEY**, the name given in medieval times to the mimic battles of mounted knights, who displayed their military prowess by tilting at each other with blunted lances or by fighting with swords. A tournament was usually arranged by some prince or noble, who sent a herald to foreign courts, or through his own dominions, announcing the "clashing of swords in presence

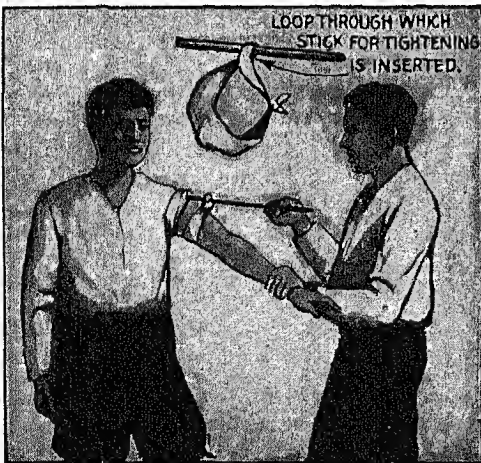
of ladies and damsels." The combats took place on horseback, and each knight generally carried some emblem of his lady's favor. Minute regulations were enforced, which lessened the danger of the tourney, although there were sometimes combats *à l'outrance*, or "to the death." In every tournament there were a great many single encounters, as well as combats between parties of knights.

The tournament is said to have originated in the tenth century. However, these contests were probably most popular during the eleventh, twelfth, and fifteenth centuries. The first combats were held in France, but the custom spread to England, Germany, and the south of Europe. It was during the fifteenth century that characteristics of the pageant began to enter into the tournaments, and this explains, perhaps, why the modern carnival or pageant is often called, in error, a tournament.

The Modern Tournament. This is an affair held by soldiers or athletes to exhibit their training in the use of arms and accouterments, and their skill in military maneuvers, games, and sports. Series of games lasting several days are also called tournaments, as tennis and golf tournaments.

In Literature. A thrilling description of a medieval tournament is to be found in Sir Walter Scott's famous historical novel *Ivanhoe*; and in Disraeli's novel *Endymion* there is an interesting account of the tournament at Eglinton Castle, Ayrshire, in 1839, which was an attempt to revive the splendors of the tourney in comparatively modern times.

TOURNIQUET, *toor' nih ket*, an instrument or device used to check bleeding in an accidental wound, or to stop the flow of blood



A TOURNIQUET

during an amputation. A simple tourniquet, for use in case of emergency, can be made from a stocking, handkerchief, or other piece of

cloth. If the wound is a cut artery—and in that case bright-red blood will spurt out in jets—tie the cloth around the limb at a point between the wound and the heart, slip a short stick into the loop, and twist the stick until the bleeding is checked. It is best not to permit the tourniquet to remain tight for more than fifteen minutes at a time, for it is liable to cause necrosis or gangrene of the limb. If nothing is at hand to make a tourniquet, compress the bleeding vessel with the finger, at the proper pressure point. If the hemorrhage is from a cut vein, causing an even flow of dark-red blood, apply the pressure on the side away from the heart. Tourniquets are very rarely needed for bleeding from a vein.

Surgeons' tourniquets are of various forms. One of these is a semicircular piece of metal used in compressing the aorta in the abdomen; another is a piece of flat rubber tubing, which is wound around the limb several times; still another consists of a padded strap to compress the artery, a band which is fastened around the limb, and a bridge-like device over which the band passes. This bridge is raised by a screw, when it is desired to tighten the band. See BLEEDING; FIRST AID TO THE INJURED. L.M.T.

TOURS, *toor*. See FRANCE (Interesting Cities).

TOURS, BATTLE OF. See FIFTEEN DECISIVE BATTLES.

TOUSSAINT, *too saN'*, FRANÇOIS DOMINIQUE (1743-1803), a statesman, revolutionist, and patriot, the greatest hero in the annals of Haiti, known as TOUSSAINT L'OUVERTURE. He was a full-blooded Negro, born in Haiti of slave parents. When affairs became troubled after the outbreak of the French Revolution, Toussaint became a leader in a slave rising (1791); but when the National Convention in France proclaimed freedom to all the slaves, two years later, he came with his forces to the assistance of the French against the Spaniards. By 1796 he had won such confidence that he was made commander in chief of the French troops on the island, and drove out the British, who by that time were beginning to attempt conquest.

Three years later, a sharp struggle took place between the Negro and the mulatto population, and at its close, Toussaint, leader of the former, found himself the real ruler of the island. He exercised a wise and beneficent sway, and the island had a period of almost unprecedented prosperity. This was interrupted, however, by Napoleon Bonaparte, dictator of France, who proclaimed the re-establishment of slavery in Haiti; when Toussaint resisted, Napoleon sent an army to compel submission. By false promises, Toussaint was induced to submit, and was then treacherously seized and carried to France, where he died in captivity. See HAITI; LATIN AMERICA (Great Liberators).

In Literature. He was a true patriot and an upright man, and to his noble qualities Wendell Phillips did full justice in one of his most famous speeches, *Toussaint L'Ouverture*. Several biographies of him have been published, with many appreciative articles on his life and work. His popular name was derived from a remark by the French governor of Haiti, that "this man finds an opening everywhere," *ouverture* being the French for *opening*.

TOWER. Towers have been built from early times as places of defense, as observation points, as ornamental structures, and for other purposes. They have served as prisons, as places of refuge, as campaniles, and as lighthouses;



MEDIEVAL AND MODERN TOWERS

(a) Bell tower of the cathedral at Seville, Spain;
(b) tower of the Metropolitan Life Insurance Building, New York City, reaching forty-six stories above the sidewalk.

and they have been built as single edifices and as parts of churches, mosques, fortifications, and castles. In addition to the accompanying illustration, the use of the tower in modern buildings is shown in the article **ARCHITECTURE**, in illustrations of the Chrysler and Empire state buildings and Rockefeller Center, New York City, and the University of Pittsburgh; and in the article **CHICAGO**, which pictures the Chicago Tribune Tower, Mather Tower, and the Board of Trade. Some of the beautiful towers of great cathedrals are in the article **CATHEDRAL**. Among other famous towers are the *White Tower* of the Tower of London; the *Eiffel Tower* in Paris; the *Leaning Tower of Pisa*; and the *Campaniles* at Florence and Venice.

Related Subjects. The reader is referred to:

Architecture	Pisa, Leaning Tower of
Campanile	Round Towers
Eiffel Tower	Singing Tower
Lighthouse	Tower of London
Minaret	Towers of Silence

TOWER OF LONDON, a group of buildings comprising an old feudal fortress and former prison, now used chiefly by the British War Department as barracks and an armory. It is in the East End of London, on the north bank of the Thames, and just outside the limits of the old walled city. The shallow moat includes a space of thirteen acres, which is surrounded also by a high wall, and within are the grim buildings, with their enormously thick walls, the whole forming a stronghold which could well have resisted an army. Thirteen towers rise at intervals from the inner wall; each has a more or less interesting history.

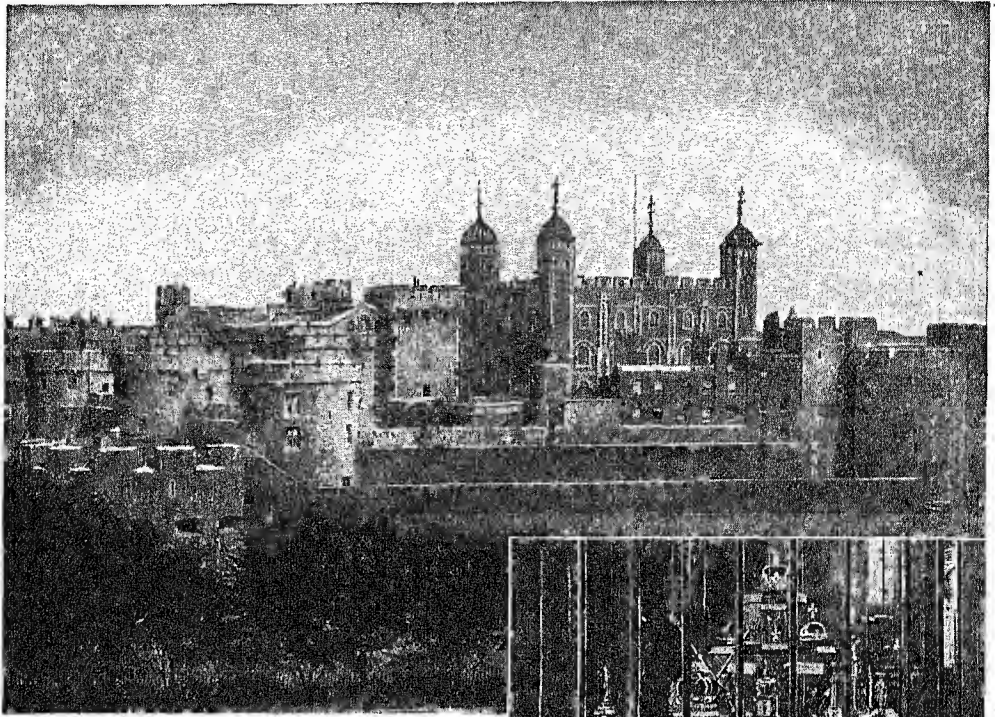
The oldest of the structures is the central White Tower, built in the time of William the Conqueror (1078) on the site of an earlier fortress, dating, according to some authorities, from the rule of Julius Caesar. The White Tower was designed by Gundulf, bishop of Rochester. Some of the early kings of England resided and held court in the Tower, each adding something to the fortifications; but it is chiefly for its history as a prison that the great group is interesting. Many distinguished prisoners were led forth from one or another of its buildings to execution; and a large number of these, including Sir Thomas More, Anne Boleyn, Lady Jane Grey, and Catharine Howard, lie buried in the Tower Chapel. Sir Roger Casement, the leader of the Irish rebellion of 1916, was confined in this historic prison until his execution. A great collection of armor, founded by Henry VIII, is in the White Tower.

To-day, besides arms sufficient to fit out a large army, the Tower of London contains the royal jewel office, with its treasures of gold and precious stones, including the crowns, scepters, and other regalia. During World War II, parts of the Tower were damaged by German bombs, but the jewels had been removed before the war began. The Tower Guards are called Yeomen Warders, a body of more ancient origin than the Yeomen of the Guard of which they are now a part. See **YEOMAN** (Yeomen of the Guard); **LONDON**; illustration, page 7228.

TOWER OF THE WINDS. See **ATHENS** (The Ancient City).

TOWERS OF SILENCE. Among the Parsees of India, who are followers of the ancient fire-worshipping cult of Zoroaster, and do not believe in burial, it was long the custom to expose the bodies of their dead on so-called Towers of Silence, or *dakhmas*, to be devoured by vultures. In pursuing this practice, they have adhered strictly to the precepts of their ancient creed, as set forth in the Zend-Avesta (which see); but the British administrative officials in India have long frowned upon this Parsee method of disposing of the dead, and it is falling into disuse.

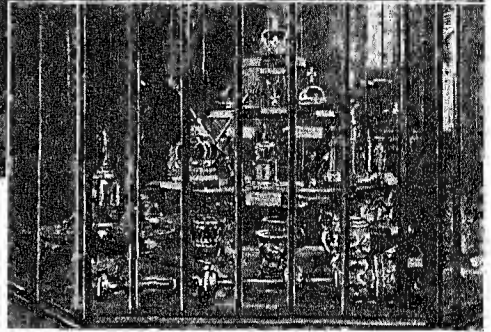
The construction of the Towers of Silence facilitates the disposal of the bones left by the



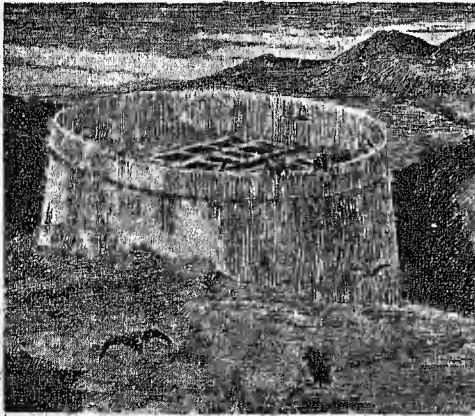
Photos: O R O O

THE TOWER OF LONDON

A center of interest for the entire British Commonwealth of nations. The inset shows the British crown jewels, which are in the Tower. (See page 7227.)



vultures. They are squat towers, circular or rectangular, seldom exceeding thirty feet in height, and are built over a deep pit, with an exposed grating at or near the top, on which the



ONE OF THE TOWERS OF SILENCE

[See, also, the article BURIAL, for a more elaborately constructed tower.]

bodies are laid. After the vultures finish their work, the bones drop into the pit below.

The Parsees of India, descendants of ancient Persians who emigrated in the eighth century, when their country was conquered by the Arabs, now number about 100,000. Many of them are wealthy, and, despite their funerary customs, they are generally well educated and commercially enterprising. They set apart each year one day for a festival in honor of a deity who is supposed to preside over the departed souls of men. On that day, the people congregate on the hills where the Towers of Silence are situated, and pray for the departed souls, while ceremonies for the dead are performed by the white-robed priests of the Zoroastrian cult. See ZOROASTER; PARSEES.

TOWN MEETING, an annual assembly of voters in the New England township. It originated in, and is a survival of, colonial days (see COLONIAL LIFE IN AMERICA [Town meetings; How News was Spread]). The township system is the purest form of democratic government known, because it is government by the people themselves, not government by their elected representatives. Once a year there is held a town meeting which is attended by the voters who are twenty-one years of age

and over. At these meetings, selectmen, trustees, school officials, and other officers are elected, town laws are enacted, taxes are voted for the coming year, and local improvements and other business matters are discussed and decided. A record of all business transacted is made by the town clerk. The township system is a typical New England institution, but it has been adopted, sometimes with modifications, elsewhere.

TOWNSEND PLAN, an old-age pension project originated in 1934 by Francis E. Townsend, a physician of Long Beach, Calif. The plan stipulates that all United States citizens over sixty years of age be paid \$200 per month, the funds to be provided by a 2 per cent transaction, or turnover, tax. The pensioner must not be gainfully employed, must not be an habitual criminal, and must spend each monthly payment within thirty days.

TOWNSHEND ACT. See **REVOLUTIONARY WAR** (Causes).

TOWNSHIP. See **COUNTY**; **LANDS, PUBLIC**; **MASSACHUSETTS** (Government); **MUNICIPAL GOVERNMENT**; **TOWN MEETING**.

TOWTON FIELD, BATTLE OF. See **EDWARD** (IV, England).

TOXEMIA, *tok se' mih ah*. See **BLOOD** (Blood Poisoning); **TOXINS**.

TOXICOLOGY. See **PHARMACOLOGY**.

TOXINS, *tok' sinz*, poisonous substances formed by the growth of bacteria. Some toxins remain within the bacteria, and others are secreted by them. Many bacterial diseases are the result of poisoning by toxins, such as diphtheria and lockjaw. Both diseases are *toxemias*. Some antitoxins are made by injecting toxin into large animals. W.A.E.

Related Subjects. The reader is referred in these volumes to the following articles:

Antiseptic	Disease (Germ Theory of Disease)
Antitoxin	Life Extension
Bacteria and Bacteriology	Medicine and Drugs

TOYBEE HALL. See **SOCIAL SETTLEMENT**.

TOYS. The desire to imitate the action of his elders is born in every child. Toys are artificial helps in this universal mimicry, and if they are not furnished, substitutes for them, however crude, will be devised by the children, out of whatever materials come to their attention at the time.

The Right Kind of Toys. The judgment of those who have made a study of children and their play favors decidedly the acorn cups and the chair horse, rather than too elaborate substitutes. Occasionally, a child is found who seems to be completely lacking in the happy faculty of "make-believe." He can see only what is there, can hear only actual sounds. He cannot in imagination clothe the broken kitchen chair with glossy hair and waving mane, or hear the fierce growls of the dragon that lurks

in the dark under the table. Such a child demands elaborate toys that leave no details to be supplied.

But the ordinary child is not thus handicapped. Give him a hint, and the rest follows as if by magic. The sofa can be a ship or a cave in the desert, a soldier's cot or a king's throne, all in the course of an hour; the roughly hewn wooden figure can be a robber chief or an Indian, a hero or a villain, and can actually look, to the child's eyes, like every one of these in turn. To give to such a child toys too elaborately wrought is to do him a real injury. *Creative imagination should be fostered, not stifled, in every child.*

The best kinds of toys, then, are those that suggest, rather than fulfill, and those with which the child can really do something. Mechanical toys, which supply their own energy, should never be allowed to take the place of those into which the child must infuse a part of his own life and energy. For boys, however, toys which allow an expression of the constructive instinct are most desirable.

The Home-Made Toy. It follows from this that the toys which are made by the children themselves are the ideal ones. Expensive materials and tools are neither necessary nor desirable; an array of boxes of various sizes, spools, paper, string, and cigar-box wood, together with a hammer, scissors, and small nails, and a bottle of glue, will keep the ingenious child happy indefinitely. The doll's house may be furnished throughout with furniture made of pasteboard or heavy paper (see **KINDERGARTEN**), and the doll inmates, with all their changes of costume, can be fashioned easily, according to suggestions made in the article **DOLL** (Paper Dolls). Clothespin men afford much amusement, and spools and match boxes provide material for all sorts of carts and wagons. The child who is "handy" and has a fair degree of ingenuity can manage to make use of many of the odds and ends which are thrown into the wastebasket.

The making of such toys furnishes an excellent introduction to the manual-training work of the schools; and any boy who has taken manual training should find no difficulty in making, for the delight of his younger brothers and sisters, many simple wooden toys.

History of Toys. Just because toys are imitative and reflect the fashions and the interests of the day in which they are made, they are of real interest to students. The jointed wooden dolls and the crocodile with movable jaws, found in the tombs of ancient Egypt, make that far-away time and country seem much closer and more human, while the tops and hoops with which the Roman children played prove that child nature and child desires have changed little through the centuries. Doubtless the Roman boys played at chariot-racing



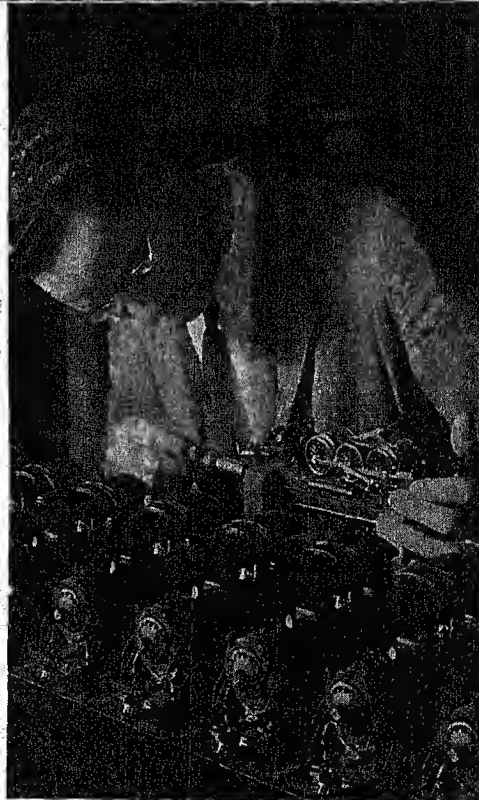
Photos: Pix; Lionel

TOYMAKING

with improvised chariots, and the boys of the Middle Ages probably fashioned for themselves standards ornamented with the Cross of the Crusaders.

There is one curious thing about those toys which have been preserved from the Middle Ages, and that is the infinite care and fine workmanship which are everywhere visible. There were no special toy-makers in those days, and the goldsmith who made the elaborate ornaments for the cathedral not infrequently condescended to carve miniature soldiers or horses for the children of his wealthy patrons.

Every advance in science left its mark on the toy-making of the day. When the balloon ascensions of the Mont-



IN AMERICA

golfer brothers were holding the attention of the world (see BALLOON), children everywhere were amusing themselves with toy balloons, and were climbing to high places in order to launch toy parachutes. When automobiles became practicable and common, the toy machine followed close upon the real one; and in these later days, there is scarcely a boy with any hint of ingenuity who has not busied himself with make-believe flying machines.

The making of toys has become a vast industry in recent years. For a long time, however, the manufacture of these child necessities was practically confined to Europe, the French making the costly and

beautiful toys, the Germans the simpler and less artistic ones. Nuremberg long has been the center of toy-making in Germany. In that country, for many years, toys have been made in the homes. Indeed, certain villages have been noted for just one kind of toy, dolls being made in one place, and animals in another. Until the last years of the nineteenth century, there was not a doll factory in the United States. The change had begun before the outbreak of World War I; for several years, toys of American children were being made in America in steadily increasing numbers. During the war, importations of foreign toys almost ceased, and it became evident that the hundreds of American factories could turn out toys which were more attractive than the imported ones, and which were almost as cheap. Winchendon, Mass., is the greatest toy center in the United States, nearly every enterprise in the town being a toy factory.

Since the war, the United States has placed an almost prohibitive duty upon the importation of foreign toys, in order to stimulate domestic production. It is now estimated that the toy business of the United States averages \$100,000,000 annually. M.V.O.'s.

Related Subjects. The reader may refer to the following articles in these volumes:

Child	Kindergarten
Doll	Play
Games and Plays	

TRACER BULLETS. See AMMUNITION (Small-Arms Ammunition); WORLD WAR II.

TRACERY, the intersecting rib work, bands, and fillets in the upper part of Gothic windows, used for support and for ornamentation. The



FAN TRACERY

Example from the vault of Henry VII's chapel, Westminster Abbey.

term is also applied to the interlaced work of a vault, walls, or panels in Gothic churches and cathedrals, and may be extended to similar forms used in relief, as wall decoration (sometimes called *wall tracery*); hence, figuratively,

it may refer to any intricate line pattern. The art of tracery was first practiced in Gothic architecture in France and England in the thirteenth century. It was then used in window ornamentation, but has gradually extended to almost every part of church buildings.

The chief forms of tracery include the *geometric*, with bars or ribs all about the same distance from one another; the *flowing*, with free, curving lines; and the *flamboyant*, with flowing and swaying lines. The latter is an elaboration of the flowing style.

Church architects in recent years, working in a modernized Gothic style, have found in tracery a valuable means of expression. The Liverpool Cathedral, which is still uncompleted, and the new Church of the Heavenly Rest, New York, furnish examples of this modern tracery, as Lincoln Cathedral, England, dating from the thirteenth century, does of the old.

Fan Tracery. This is a form of ornamentation used on the surface of vaults (see VAULT). It is an elaborate, carved tracery which spreads out like the folds of a fan.

TRACHEA, *tra' ke ah*, the scientific name for the principal air tube in the human body, which is commonly spoken of as the *windpipe*. The trachea starts at the pharynx, and can be felt in the front part of the neck as a section of hard ridges. It ends with the bronchial tubes, and through these structures communicates with the lungs (see illustration under LUNGS). The larynx, or voice box, is a modified part of the trachea. In an adult, the windpipe is about three fourths of an inch in diameter. It consists of a supporting layer of connective and muscular tissue, lined with mucous membrane, and its walls are kept from collapsing by incomplete rings of hard cartilage, which enclose the tube at the front and on the sides. The back of the tube rests against the oesophagus. On the surface of the mucous membrane there is a layer of cells, each of which terminates in a tuft of tiny threads. These delicate hairs, or *cilia*, are constantly moving back and forth, and their purpose is to force dust particles and bits of mucus away from the lungs. K.A.E.

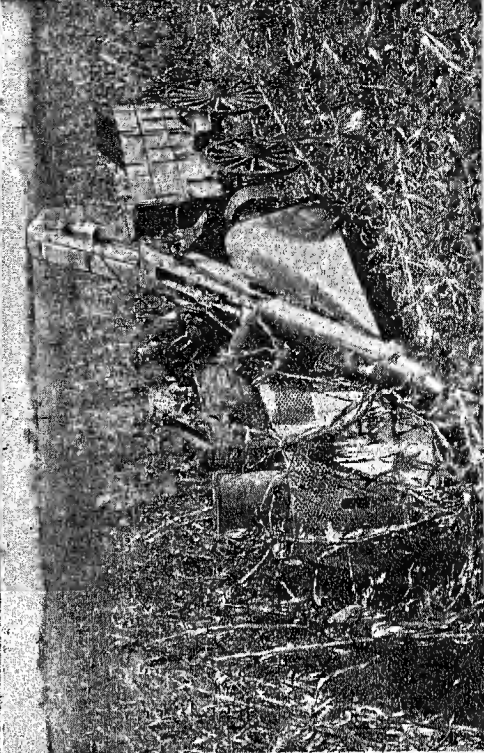
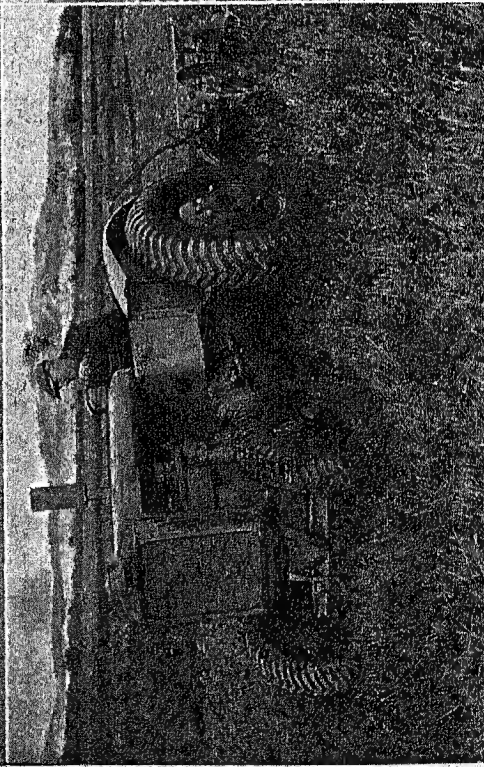
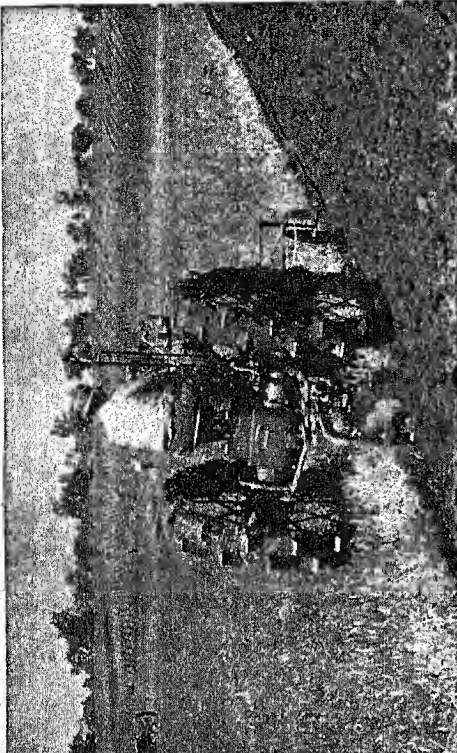
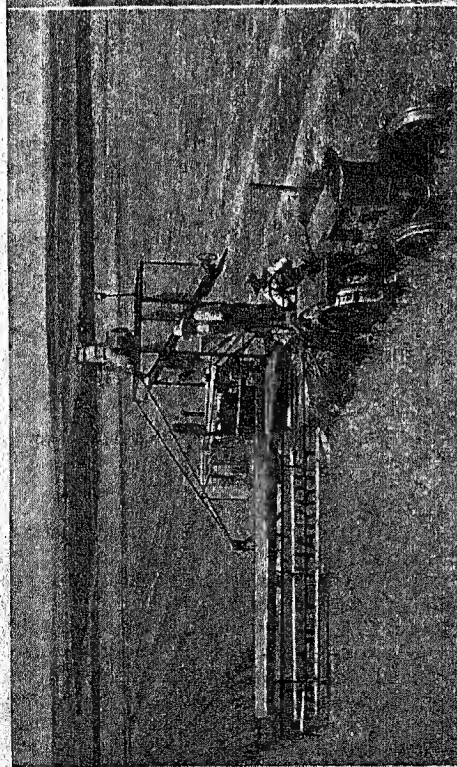
Related Subjects. In connection with this subject, the reader should consult the following articles:

Breath and Breathing	Lungs
Larynx	Nose

TRACHODON, *tra' ko dahn*. See illustration in article DINOSAURIA.

TRACHOMA, *trah ko' mah*. See BLINDNESS (Common Eye Diseases).

TRACHYTE, *trah' ile* or *tra' kite*, is a volcanic rock consisting chiefly of glassy feldspar and a small amount of biotite, hornblende, or augite. The name is derived from a Greek word meaning *rough*, and was applied because the small, lathlike crystals make the broken



Tractors. Upper left: tractor on Western plains, drawing combine harvester which cuts and threshes the grain. Upper right: new small cultivating type tractor pulling one plow. Lower left: rubber-tired tractor, giving more speed and lower fuel consumption. Lower right: tractor pulling corn picker.

surfaces of specimens rough to the touch. In color, trachyte ranges from pale gray through pink to black. Trachyte is found in the United States in Wyoming, Colorado, Montana, South Dakota, Utah, Washington, and Nevada. It occurs in great abundance along the River Rhine and in Italy, France, and the Azores. A.J.

TRACTARIANS. See **OXFORD MOVEMENT**.

TRACTION ENGINE, OR TRACTOR.

Tractors equipped with internal-combustion engines of a small or medium size, adapted to agricultural work in the fields, though mostly on small farms, were first developed about 1914. Prior to that time, most of the tractors with internal-combustion engines were very large and crude affairs, and also undependable and expensive to operate. With a trend toward lighter machines per unit of power, their efficiency and utility have substantially increased. As an example, the old-type, large, heavy tractors were not usually able to develop a pull greater than approximately one-third of their total weight, whereas practically all modern tractors can exert a pull equal at least to two-thirds of their weight, and many can do better than this.

In the development of the modern tractor, many different shapes and wheel arrangements have been tried out. Some have two wheels, some three, and others four, and some have endless tracks or belts, upon which they run. At the present time, the majority of farm tractors are of the four-wheel type, with the arrangement of wheels and the application of power similar to those of an automobile. There is one other type that is used to some extent for farm work, known as the tracklayer type, or *crawler*, which became familiarly known during World War I, through its military development into "tanks."

Most modern tractors are unique in design, in that the gear housing is also the frame of the tractor. This arrangement simplifies the construction considerably, and insures a rugged, substantial construction that maintains correct alignment of the working parts. Rubber treads have made traction easier and more comfortable.

The modern tractor, in addition to being comparatively light in proportion to the power which it can develop, is sturdy, dependable, comparatively long-lived, and efficient in the use of fuel and oil. It is also easy to handle. It is a comparatively easy job to handle a tractor that will pull three fourteen-inch-bottom moldboard plows; whereas six to eight big horses would be required to pull the same plow. These would be more difficult to handle in the field, and would require a great deal more time and attention in feeding and care, and in hitching up and unhitching.

The tractor apparently has taken its place as an important power unit upon American farms, and continues to be used in greater

numbers. The principal advantages of the tractor are, first, that it enables one man readily to do more work; second, it is usually possible to harvest the crops with a greater economy of time, thus producing better crops; and third, if the machine is properly managed, the cost of doing work with a tractor is usually less than the cost of doing the work with horses. The comparative costs of tractor and horse power vary with the cost of fuel and feed and, to a certain extent, with other factors. See **IOWA (Memorable Events)**. F.W.D.

[American tractors of both the wheeled and the tracklayer type are now exported to all parts of the world, exports being more than twenty-two per cent of the total yearly production. There are about twelve American concerns manufacturing wheeled agricultural tractors, and four producing the tracklayer type, which originated in California. For illustrations, see **AGRICULTURE; WORLD WARS I and II**.]

TRACTOR. See **TRACTION ENGINE**.

TRACY, MARQUIS DE. See **CANADA (History)**.

TRADE. See **COMMERCE**.

TRADE, BOARD OF. See **BOARD OF TRADE**.

TRADE ACCEPTANCE. The Federal Reserve Board defines a trade acceptance as "a bill of exchange (time draft) drawn by the seller on the purchaser of goods sold, and accepted by such purchaser." It differs from the ordinary time draft in being made at the time of the sale, instead of at the expiration of the term of credit for the purpose of giving additional time.

The trade acceptance is a preferred class of collateral security, and may be discounted at a bank for approximately face value. This is a great advantage to manufacturers and merchants with limited capital, as it obviates the necessity of tying up their capital in open book accounts, or of resorting to heavy borrowing. The discounting of trade acceptances does not affect the borrowing capacity of a firm in regard to its own or others' notes.

The closing of a credit sale by a trade acceptance promotes promptness in paying accounts; for the acceptance may be collected through a bank if it has not been discounted. Furthermore, as a rule, an obligation maturing at a bank will be paid more promptly than an open account.

The trade acceptance has been used quite generally in Great Britain and continental Europe. In recent years, there has been a movement in the commercial centers of the United States in favor of the trade acceptance, and its use is increasing. See next page.

TRADE DISCOUNT. See **DISCOUNT**.

TRADE-MARK, a mark, sign, device, word, or picture printed or stamped on manufactured goods for purposes of identification. It may be registered in the Patent Office and its use prohibited to all except the owner.

TRADE ACCEPTANCE	No. 76	Chicago, Ill. July 10, 1934.
	To James & Whitney	Duluth, Minn.
	On August 10	Pay to the order of Ourselves
	One hundred twenty-five ----- Dollars (\$125.00)	
	<i>The transaction which gives rise to this instrument is the purchase of goods by the acceptor from the drawer.</i>	
	Accepted at Duluth, Minn. July 14, 1934	Bank Woods, Hutchinson & Co.
	Payable at Union National Bank	Bank Location: Duluth, Minn.
	Buyer's Signature: James & Whitney By Agent or Officer: Whitney	

A TRADE ACCEPTANCE (SEE PRECEDING PAGE.)

The trade-mark is an outgrowth of a desire on the part of manufacturers to place beyond the range of fraudulent imitation goods for whose quality they have won a reputation, and to afford the public ready means of identifying goods which they have found satisfactory. In olden times, a producer sought to identify himself with the quality of his work; for example, the shoemaker naturally wished to be known as "Tom Jones, the shoemaker." In a small community, nobody ever thought of shoes without thinking of Tom Jones, or of Tom Jones without thinking of the good shoes he made. So long as business was personal, Jones's products needed no other identification. But modern business is not personal; the user of an article seldom knows who made it. Thus there arose a need for a name or a mark which the public could be taught to associate with a certain article.

Although trade-marks have been in existence for centuries, their present importance and legal position are a product of modern industrial conditions. As recently as the middle of the eighteenth century, the English courts declared that a trade-mark did not exist in the sense in which the term is now used; if one man could use a mark, anybody could use it. In 1803 the English courts first attempted to prevent fraudulent use of another person's trade-mark. The first United States statute on the subject of registration of trade-marks was passed in 1870, and was declared unconstitutional; the statute now in force was passed in 1905, and amended at various dates.

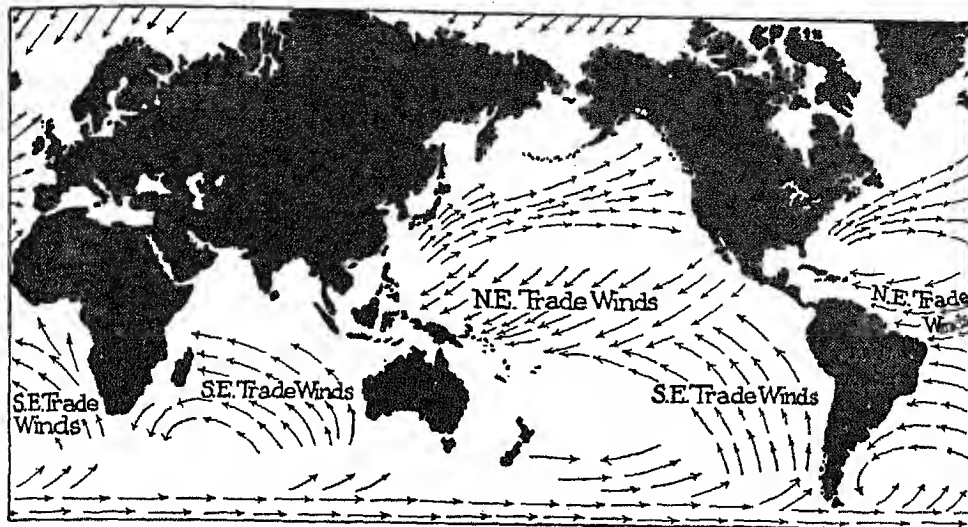
What Constitutes a Good Trade-Mark. Although a trade-mark may consist of merely a signature, a picture, a sentence, or symbol, the selection of what would be considered a good trade-mark is by no means easy. Such expressions as "Superior Hats," "Best Quality Leather," "Finest Teas," cannot be registered as trade-marks. A coined word, suggesting the goods or their qualities, a striking design also

bearing some definite relation to the articles to be marked, or some unique phrase, is usually sought, and so widely advertised do many of these trade-marks become that the sight of them is sufficient at once to suggest the articles, as well as the manufacturers, for which they stand.

Value of Trade-Marks. It would be quite impossible to state the value that attaches to certain trade-marks. Were it permissible to mention specific articles, the following illustrations would perhaps be more forceful. A competitor of a stove-polish-maker whose trade-mark is known in every home offered a million dollars solely for that trade-mark. He did not want his rival's factory nor his selling organization—simply the name was required—but the successful company placed a higher value upon the device, and would not sell. The soap business presents at least three instances of immensely valuable trade-marks, one probably so highly valued that no offer could secure it. Everybody knows the photographic apparatus for which a new word was coined; the name of a certain biscuit is better known than any other. The crowing cock and the growling lion, representing certain moving-picture companies, are familiar.

Term and Cost. In the United States, a person who wishes to secure a trade-mark makes application to the Patent Office, submitting the design he wishes to use, accompanying it with a fee of fifteen dollars. If his design meets the requirements of the law, the permit is issued; if used continuously, it is valid for twenty years, and is subject to renewal for a like term. The words "Registered in U. S. Patent Office" or their abbreviation "Reg. U. S. Pat. Off." should appear on the goods.

The British trade-mark laws are similar. Registration of trade-marks has only been permitted since 1875, but during the first part of the nineteenth century, owners were protected by the common-law practice. Between 1905



LOCATION AND DIRECTIONS OF THE TRADE WINDS

and 1919, the statute law was amended and remodeled. Registration in England now grants sole ownership for a period of fourteen years, and for another period of fourteen years, if the owner desires renewal.

In the Dominion of Canada, there are two kinds of trade-marks which may be registered; these are termed *general* and *specific*. A general trade-mark is one used in connection with the business or occupation as a whole; such a trade-mark may be registered on payment of a fee of thirty dollars, and once registered, it endures forever. A specific trade-mark is used in connection with a particular article or class of articles; the registration fee is twenty-five dollars, and the period of protection is twenty-five years, subject to successive renewals for periods of twenty-five years each.

International Regulations. By the Convention of Paris of 1883, the nations which were represented agreed that citizens or subjects of each should enjoy, in all such nations, all the present or future privileges as regards trade names and trade-marks that obtain in their own country. By the Arrangement of Madrid, in 1891, a trade-mark registered in any one country is thereby registered in all the countries which agreed to the Arrangement. Great Britain did not sign this Arrangement, but it has special agreements with nearly every country in the world. Thus a citizen of any country, if he complies with a few simple regulations, secures protection in most nations.

TRADE SCHOOLS. See SCHOOL (Special Schools); VOCATIONAL EDUCATION.

TRADE UNION. See LABOR ORGANIZATIONS.

TRADE WINDS, those winds that blow regularly from about the twenty-eighth paral-

lels of north and south latitude toward a low-pressure belt at the equator. They blow from the northeast in the northern hemisphere and from the southeast in the southern hemisphere. The trades blow very steadily and in a uniform course over the oceans, and in the days of sailing ships, navigators greatly depended upon them. It was the regularity of these winds, especially over the oceans, that gave them their name, the term "trade" being used in its old and obsolete sense of *course*, or *track*. The course of the "trades," as sailors call them, over land areas is more irregular, because of variations in temperature, influence of mountain barriers, and various local disturbances.

These winds are a part of the great system of planetary winds caused by differences in temperature between the equatorial and Polar regions. The great heat of the equatorial region causes the air in the Torrid Zone to become rarer and lighter, and consequently there is an upward current into the higher atmosphere. The surface currents from cooler regions north and south, which flow into the equatorial belt to take the place of the ascending currents of warm air, form the trade winds. The fact that they blow obliquely, instead of directly north and south, is due to the rotation of the earth on its axis. This movement turns them from a straight course, and makes them easterly winds. The belt between the two sets of trade winds is a region of calms, in which sailing vessels in former days sometimes drifted for weeks. The trade-wind zone itself shifts north and south with the seasons.

On land areas, the trades have considerable effect on rainfall. When they blow over lowlands, they take up moisture present in the atmosphere and create barren regions, as in the

case of the Great Sahara and the Central Australian deserts. When they blow against mountain ranges, they are forced upward, and the air on rising is cooled. This causes the moisture to be condensed and rain to fall. The north-east trades, for example, cause the heavy rainfall on the eastern slopes of the Andes and of the Mexican and Central American highlands.

R.H.W.

Related Subjects. See WIND, for diagram of the circulatory systems of the world, and for list of other winds with which the trades may be compared in their cause and effect.

TRADING WITH THE ENEMY. See BLACKLIST.

TRAFALGAR, *trafal gahr'* (in England, *trafal' gur*), a low and sandy cape on the south-west coast of Spain, at the entrance to the Strait of Gibraltar. It was off this cape, on October 21, 1805, that the famous battle was fought in which Lord Nelson lost his life (see page 4874). Although the English ships were outnumbered by the combined French and Spanish fleets under Villeneuve and Gravina, the superior skill and confidence of the British secured a decisive victory, the French and Spanish losing nineteen out of twenty-four ships. It was on this occasion that Nelson signaled to his fleet, "England expects every man will do his duty." The battle, although a brilliant victory, ended in gloom, for Nelson was mortally wounded in the hour of his greatest triumph.

Trafalgar, since Nelson's time, has been the name of one of the most important squares in London. On the north side of the square is the National Gallery; on the east the Strand and Saint Martin's Church; on the south Whitehall, the Horse Guards, and the War Office; to the west is the Haymarket, with His Majesty's Theater and Waterloo Place. In the square, guarded by Landseer's lions of Britain, is the monument to Nelson. See NELSON, HORATIO; LONDON.

TRAFFIC REGULATIONS. See ROADS AND STREETS (Traffic Regulations).

TRAGACANTH, *trag' a kanth*, a gummy substance yielded by the stems of various thorny shrubs of the pulse family, found in Asia Minor, Persia, and Syria. The gum exudes through fissures or cuts in the bark, and is usually marketed in the form of thin flakes. It is of a dull-white or yellowish color, translucent, and horn-like in texture. Tragacanth is used as a soothing remedy for sore throat, as an ingredient in lubricants for chapped hands, and also to impart firmness to lozenges and pills. It is also used in the arts as a substitute for gum arabic (which see).

TRAGEDY, a form of the drama which calls for a serious theme, dignified treatment, and usually a disastrous ending. The word *tragedy* is from Greek words meaning *goat songs*, and

was probably applied to the chants used by the men, clothed in goatskins, who represented the satyrs in the festivals of Bacchus. From the chants tragedy took its rise, and it was developed by the Greeks to a very high point. Aeschylus, Sophocles, and Euripides had each a great part in this development. The Greeks took their tragedies as seriously as their religion; Aristotle gave as the reason for the existence of tragedy the "purification of the passions through the arousing of fear and pity."

One of the greatest names in the history of tragedy is that of Shakespeare, whose *Hamlet*, *King Lear*, *Othello*, *Julius Caesar*, and *Macbeth* have place among the few tragedies which are of very first rank; for, since tragedy at its best is the highest form of poetry, it could scarcely be hoped that great examples should be numerous. Tragi-comedy is serious drama in which the outcome is happy, Schiller's *Wilhelm Tell* furnishing, perhaps, the best example of this form. Though the great tragedies of the past, presented by great actors, always find a ready hearing to-day, the large majority of theatergoers prefer lighter plays, and the comedies produced far outnumber the tragedies.

Related Subjects. The reader is referred in these volumes to the following articles:

Aeschylus	Drama	Shakespeare
Comedy	Euripides	Sophocles

TRAGOPAN, *trag' o pan*, a handsome bird of the pheasant family, found in the region of the Himalayas, dwelling in forests high up on the mountain slopes. It is noted for bright,



THE TRAGOPAN
About one-tenth actual size.

variegated plumage, and for two fleshy protuberances which hang behind the eyes. In the breeding season, the male woos his mate by proudly erecting and distending these protuberances until they have the appearance of

horns. The male bird also has two large wattles which hang at the sides of the lower mandible, and these are displayed conspicuously in wooing. Tragopans feed on insects, leaves, fruits, and seeds. They nest in trees. The white eggs, slightly speckled with dull lilac, resemble those of the common fowl. The birds are shy and are usually snared, being slowly driven toward nooses placed in openings near the point of two lines of converging hedge. D.W.

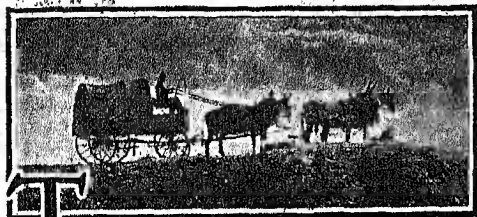
Classification. There are five species, belonging to the family *Phasianidae*. The best-known species is the crimson tragopan, or horned pheasant, of India, *Tragopan satyrus*.

TRAILER. See AUTOMOBILE.

TRAILING ARBUTUS. See ARBUTUS.

TRAIL, *trayl*, CATHERINE PARR (1802-1899), a Canadian novelist, known for her vivid sketches of pioneer life in Canada. Mrs. Traill was born in London, England. She was the third of the literary Strickland sisters; the two elder, Agnes (1796-1874) and Elizabeth (1794-1875), were known for their historical writings for children, and a younger one, Susanna, gained a reputation as a novelist and poet of Canadian life (see MOODIE, SUSANNA). In 1832, after her marriage to Lieutenant Thomas Traill, Catherine emigrated with her husband to Canada, and settled in the backwoods of Ontario. The pioneer's trials she portrayed in many novels and sketches.

Her Writings. These include *Backwoods of Canada*; *Canadian Crusoes*; *Rambles in the Canadian Forest*; *Pearls and Pebbles, or, Notes of an Old Naturalist*; and *Studies in Plant Life in Canada*.



TRAILS OF EARLY DAYS. Recent decades have witnessed a widespread movement for good roads in the United States and Canada. What is understood by a good road to-day is a hard-surfaced roadway, wide enough for two or more lanes of traffic, with moderate grades and curves, and running in as direct a course as possible. The immediate cause of the universal demand has been the development of the automobile as a common means of travel. The efficiency of this swift machine has made it necessary that roads adapted to its use be built everywhere.

In the pioneer days of America, the need for roads was even more imperative. Before the days of the railroad, the horse was the chief motive power for the transportation of goods and people. Boats were used wherever there

was water, but most of the localities had to be reached by land. The problem of making roads to the interior from lake and ocean shores was a critical one for the early inhabitants. The opening up of new settlements, the expansion of trade, and the progress of national life, all depended upon the existence of passable roads. See PIONEER LIFE.

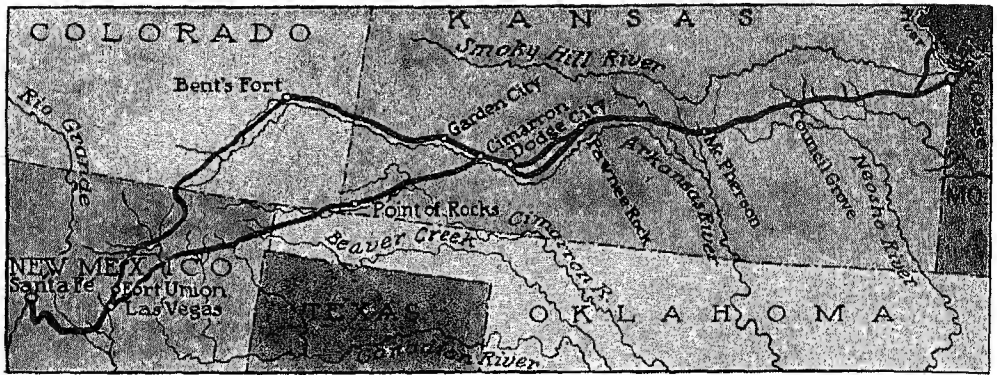
The earliest roads were Indian trails, which were little more than paths through the wilderness. They could be followed on foot or horseback, but were not suitable for wheeled vehicles. When the early settler set out for a new part of the country, he needed his wagon as a means of conveying his goods and family. The difficulties which he encountered were often so great that both courage and resourcefulness were required to overcome them. Trees had to be cut down and removed, streams forded, and forbidding mud negotiated. Yet such was the spirit of the pioneers that they advanced in spite of all obstacles.

Road-making passed through three periods. The first stage was that of locating the roads and clearing off the timber. Holes left by the removal of trees were filled with brush and stones. The dirt surface was soon worn into ruts and bumps, and in wet weather, mud was always to be reckoned with. These roads, crude as they were, enabled the pioneer to go to market and to do the limited traveling which his busy life permitted.

The second stage was that in which either gravel or planks were used to build hard-surfaced roads called turnpikes. Private capital was employed for their construction, though, in some cases, the Federal or a state government assisted by granting a subsidy. Toll was collected from all users of the turnpike, in order to repay the construction cost. In the eastern part of the United States, many turnpikes were built. One of the most famous was the Lancaster Pike (see below).

Stagecoaches were operated on the turnpikes, to carry passengers and mail. At frequent intervals, inns or taverns were established to provide meals and lodging; for no one was expected to travel at night. The trip from New York to Philadelphia, ninety-six miles, was made in a day and a half. The fare was six dollars, and the traveler had to pay the charges for meals and lodging besides. Delays on account of bad weather were frequent, and even in good weather the swaying and jolting of the stagecoach was an ordeal not soon forgotten. It is not surprising that the railroad made such headway, once it was introduced. From about 1840, stagecoach traffic gradually declined, and the locomotive began to conquer distance with comparative ease and speed.

The third period of road-building, which extends down to our own day, was that in



THE OLD SANTA FE TRAIL

which the work was undertaken by public agencies, and both the construction and maintenance of highways were financed from the public treasury. For a full description of modern road-building, see **ROADS AND STREETS**.

Some of the early pioneer trails are listed below. Their chief interest lies in their influence on the opening up and settling of new regions, though some of them were built for military purposes.

Braddock's Road. It extended from Cumberland, Md., to Pittsburgh, Pa. It was built in 1755 by the English General Braddock, to enable his army to advance from Virginia against the French on the Ohio River. The distance was 110 miles, and it was through a rough and difficult section. The Allegheny Mountains, as well as many creeks and rivers, had to be crossed. It became one of the main roads to the Ohio Valley, and later some parts of the Cumberland Road were built on its roadbed.

Cumberland Road. See article, page 1784.

Lancaster Turnpike. This road was built in 1792-1794 from Philadelphia to Lancaster, Pa., a distance of sixty-two miles. It was built of stone, at a total cost of \$465,000. The roadway was thirty-seven feet wide, of which twenty-four were laid with stone. This was the first chartered turnpike in America. Its construction marked a new era in transportation, and created the problem of the control of public corporations by legislative restrictions.

Mohawk Trail. This was a route through Central New York from Albany to Buffalo. Its eastern course was through the valley of the Mohawk River. Its great advantage to New York was that it gave a level route to the Great Lakes and the West. To-day, the New York Central Railroad follows the course of this historic roadway, and a modern automobile highway traverses the attractively scenic valley.

Oregon Trail, also called the **Overland Trail.** This road extended from Independence, Mo., to the Columbia River, a distance of 2,000 miles. Its general course was through Nebraska, Wyoming, Idaho, and Oregon. At Granger, Wyo., it branched to the southwest and ran through Utah and Nevada to San Francisco. The Lewis and Clark Expedition of 1804 added to the knowledge of its western section. The first wagon train was taken over it by Sublette, in 1830. In 1842 John C. Fremont surveyed the route under the authority of the Federal government. It came into such general use that, in 1845, more than three thousand emigrants to the West passed over it.



THE CONESTOGA WAGON

Among American inventions, the Conestoga wagon, which became a familiar object on American trails, must forever be remembered with respect. Originating in the Lancaster region of Pennsylvania and taking its name either from the horses of the Conestoga Valley or from the valley itself, this vehicle was unlike any other, because of the curve of its bed. This peculiarly shaped bottom, higher by twelve inches or more at each end than in the middle, made the vehicle a safer conveyance across the mountains and over all rough country than the old straight-bed wagon. The Conestoga was covered with canvas, as were other freight vehicles, but the lines of the bed were also carried out in the framework above and gave the whole the effect of a great ship swaying up and down the billowy hills. The wheels were heavily built, and had tires four and six inches in width. The color never varied: the underbody was always blue, and the upper parts were red.

—From a contemporary account.

The famous motion picture, *The Covered Wagon*, recounts the adventures of a caravan moving westward over this route.

Pennsylvania State Road. This route runs from Philadelphia to Pittsburgh, and includes, in its eastern section, the Lancaster Pike. In 1758 General John Forbes built the western half of it, to give access from the East to Fort Duquesne (Pittsburgh). He proceeded from Philadelphia by way of Carlisle

and Chambersburg. Continuing westward, he established Forts Bedford and Ligonier, and then pushed on to Pittsburgh. The forests and mountains of this section made the undertaking so difficult that the achievement was memorable in pioneer annals. The road is sometimes referred to as Forbes Road. It was used by thousands of emigrants to the country beyond the Alleghenies.

Sante Fe Trail. This was one of the longest roads of the period that preceded the railroads. From Independence, Mo., to Santa Fe the distance was 850 miles. By way of the Cimarron cut-off (see map), it was 775 miles, but the longer way was much safer. An expedition under Captain Becknell, in 1821, marked the beginning of wagon traffic, though trips had been made between these points as early as 1804.

Because of conflicts with the Indians, the trips were usually made by a party large enough to defend itself. Sometimes United States troops accompanied the caravans. A wagon train usually consisted of twenty-six wagons, each drawn by ten oxen or mules. Each wagon carried a load of about six thousand pounds, and a day's journey was seventeen miles. For many years, the traders made only one trip a year, but by 1860 there were trains leaving every few days.

The first stagecoach made the trip to Santa Fe in 1849. The time required for a regular run was two weeks, and the fare was \$250.

In 1830 the route was extended to California by William Wolfskill. It was by way of Green River, Utah, and the Virgin River, and was known as the Old Spanish Trail. The road to Los Angeles was surveyed by Lieutenant Beale of the United States army, in 1857-1858. It extended from Fort Defiance, Ariz., to Los Angeles, and continued in use as late as 1878.

Wilderness Road. This was a route from the Shenandoah Valley, Va., through the Cumberland Gap to Kentucky and Tennessee, opened up by Daniel Boone in 1775. Due to the rugged and mountainous character of the country through which it ran, it was called "the longest, blackest, hardest road" of pioneer days in America. It was also known as Boone's Trail, the Kentucky Road, and the Virginia Road. It opened a way for the settlement of Kentucky, and for westward migration from Virginia.

[The reader is referred to the article TRANSPORTATION.]

TRAIN, ARTHUR, (1875-), an American author and lawyer, whose stories combine a philosophical appreciation of the fundamental principles of jurisprudence with a sympathetic view of life. He was born in Boston and was graduated from Harvard Law School in 1899. After a quarter-century of prominence as a member of the bar in Massachusetts and New

York, including service as an assistant district attorney, he abandoned the legal profession to devote his entire time to literature, a field which he had entered in 1905.

His Books. *McAllister and His Double*, published in 1905, was followed the next year by *The Prisoner at the Bar*, which established its author's reputation as a writer of fiction in which some phase of the law was used as a plot. Among the later works from Train's pen are the following stories: *The Butler's Story*; *Mortmain*; *C. Q.*, or *In the Wireless House*; *The Goldfish*; *The World and Thomas Kelley*; *The Earthquake*; *Tutt and Mr. Tutt*; *By Advice of Counsel*; *The Hermit of Turkey Hollow*; *As It Was in the Beginning*; *Tut, Tut, Mr. Tutt*; *His Children's Children*; *The Needle's Eye*; *The Lost Gospel*; *Page Mr. Tutt*; *The Blind Goddess*; *Highwinds*; *When Tutt Meets Tutt*; *Paper Profiles*; *The Blind Goddess*; and *On the Trail of the Bad Man*, which explains his reasons for quitting the bar. *The Man Who Rocked the Earth* was produced by Train and Robert Wood.

TRAINING CAMPS, MILITARY, camps for the training of men in the principles and practice of citizenship and the cultivation of the rudiments of military art. The number of men trained was very small until 1913, when the army, through the influence of Major General Leonard Wood, established two military-instruction camps for college and university students and high-school graduates. Four were conducted in each of

the two succeeding years.

At the outbreak of World War I, four camps were established for business men, later called the Plattsburg Camps, after the largest one, at Plattsburg, N. Y. Under the National



Photo: P & A

MADONNA OF THE TRAIL

Twelve of these statues were erected in twelve states (Md., Pa., W. Va., O., Ind., Ill., Mo., Kan., Colo., N. M., Ariz., Calif.) in 1928 and 1929 by the Daughters of the American Revolution and the National Old Trails Road Association. These Pioneer Mother monuments mark the Old National Highway as a memorial to our pioneer mothers and fathers.

Defense Act of 1916, twelve summer camps, including both types, were held. The men who attended formed a nucleus of trained civilians with which to begin the great task of developing 200,000 officers when the United States entered the war. The Federal Government maintained camps for officers in 1917 and 1918. In addition, units for student army-training corps were established at colleges and universities in 1918; after a few months of training, students were to be assigned to military duty at officers' training schools. These plans were cut short by the Armistice, but the principle was continued in the Reserve Officers' Training Corps (which see).

An amendment to the National Defense Act (1916), passed in June, 1920, provided for military training camps for warrant officers, enlisted men, or volunteer civilians. In accordance with this provision, the first Citizens' Military Training Camps were held in the summer of 1921. There were twelve of these camps, distributed among nine corps areas.

The training is open to young men between the ages of seventeen and twenty-nine years, of good character and sound physical health. They must be citizens of the United States; or, if of foreign birth, they must furnish evidence of application for naturalization (first papers).

In 1940, the War Department authorized the C.M.T.C. to accept business and professional men between the ages of twenty-five and fifty. These men receive a special course of basic training modified to suit their needs. The main purpose is to provide military training for possible officers. No commissions are granted.

A man enrolled in C.M.T.C. does not receive any pay. However, the Federal Government pays his transportation to and from camp. While at camp, his food, clothing, medical care, and shelter are free.

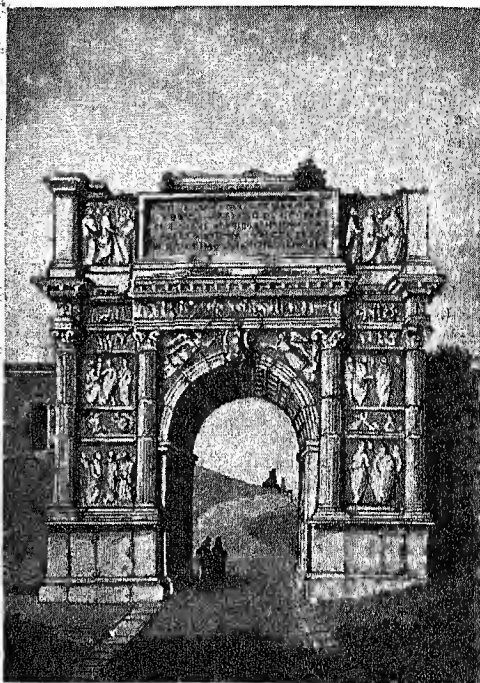
The work of enrollment is handled by the Office of the Adjutant General and the Military Training Camps Association, a civilian agency co-operating with the War Department. The Association consists of an executive committee, corps-area aides, and state aides to the Secretary of War.

In 1922 Congress appropriated \$1,800,000 for citizens' military training camps of thirty days' duration, to be held at twenty-seven places in the United States. The number grew to fifty in 1940. Congress increased its appropriation to an average of more than \$2,000,000 a year. Nearly 35,000 young men attend the camps annually.

The instruction course is divided according to the branch of service. A complete course consists of four summer-camp training periods of one month each. Those who complete the four camps and pass other requirements are commissioned as second lieutenants in the Officers' Reserve Corps. When the United

States entered World War II (which see), more than 375,000 men had received training.

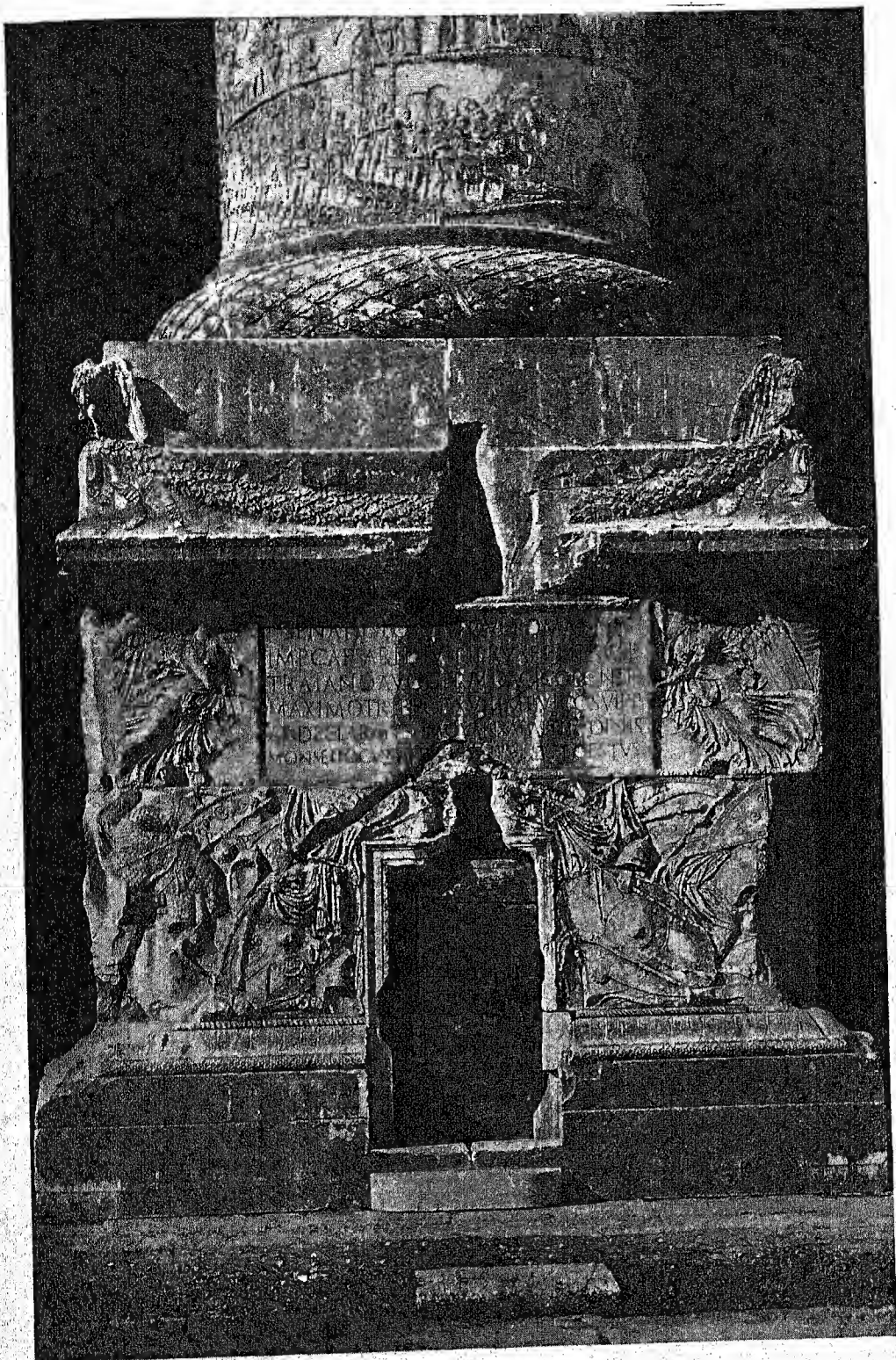
TRAJAN [MARCUS ULPIUS TRAIANUS] (52 or 53-117), one of the "five good emperors" of ancient Rome, and, among military leaders, one of the most important in the history of the empire. He was born near Seville in Spain, of a Roman family. His father was a common soldier of the legion, who fought his way up to the consulship and the governorship of Asia.



ARCH OF TRAJAN

The young Trajan was given a military education, and won distinction as a military tribune in Spain, in Syria, and in Germany. In 97 Nerva adopted him as his son and successor, and in the next year he became emperor. Citizens and soldiers were propitiated by gifts, and the Praetorian Guard was divided and scattered among the legions, that its power might be lessened. Trajan was extremely popular with his troops, even though he exercised the strictest control over them.

Much of his reign was spent away from Rome in campaigns on the frontiers of the empire. Dacia and Armenia were conquered and made provinces, and Syria, Mesopotamia, Arabia, and Parthia, which had become almost independent, were again reduced to submission. In 106 Trajan celebrated at Rome a splendid triumph, and instituted games which lasted for four months, during which 10,000 gladiators and 11,000 beasts are said to have perished in the arena. Seven years of peace followed, dur-



Trajan's Column. The present-day appearance of the base of the Column of Trajan. The removal of a rectangular stone in the base revealed a door which led to the supposed burial vault.

ing which Trajan built his Forum, which was the glory of Rome. He also built new roads and aqueducts, new harbors on the coast, and encouraged agriculture. Although in the main a military ruler, Trajan spent much time and money beautifying Rome; he lessened taxes, corrected abuses in the laws, and improved the administration of the provinces. While believing in religious toleration, he permitted a mild persecution of the Christians.

Trajan's Arch. In A.D. 114, in commemoration of the opening of a new road to Brundisium, Trajan caused a marble arch to be erected at Benevento, where it now stands, one of the best-preserved monuments and one of the finest examples of the Roman arch. The archway is twenty-seven feet high, the whole structure of white marble being fifty feet in height, and decorated with figures in relief illustrating the triumphs of Trajan in many fields.

Trajan's Column, a beautiful column erected by the Senate and people of Rome in A.D. 114, in honor of Trajan, the victorious emperor. The pedestal is covered with sculptured trophies of his victories, and, winding spirally around the column for hundreds of feet, are bas-reliefs forming a remarkable record of the Dacian wars. The column is still standing, in a state of splendid preservation, among the ruins of Trajan's Forum in Rome. The column itself is 100 feet high, and was formerly surmounted by a colossal figure of Trajan, which was replaced in 1588 by a statue of Saint Peter. In the interior of the column is a spiral staircase leading to the summit. Although the ashes of the emperor in a golden vase are said to have been deposited beneath this column, no trace of them has been found; but a chamber that may have served as the burial vault was found under the column. See illustration, page 7241.

TRANCE, *trans*, a term used very loosely, as a rule, to describe any kind of semi-consciousness or sleeping state that is abnormal. Even in medical literature, the word is not clearly defined. Originally, its use implied a belief that the soul of the person in a trance was temporarily withdrawn from the body. Now, however, the word is applied to a variety of sleeplike states, including ordinary sleepwalking, the deeper stages of hypnosis, extreme cases of lethargic melancholy, and the condition into which spiritualistic mediums seem to fall, almost at will. There are no distinctive physical symptoms of the trance state, but in many cases the pulse and respiration are slowed, and the reflexes are also affected, sometimes disappearing altogether. Two different states appear to be best entitled to the name of trance; namely, first, the trance of mediumship, and, second, what has been called the ecstatic trance. The latter state may be self-induced through excitement, especially of a religious nature, and is usually characterized by an outward appearance of rapt contemplation. On returning to a normal state, the subject usually remembers the nature of his vision or other ecstatic experience.

Modern science regards the mediumistic trance, with its seemingly profound sleep, but continued capability of speech and writing, as a state similar to deep hypnosis; while the ecstatic trance is regarded as a case of hallucination, induced by prolonged occupation of the mind with some exciting idea or image which temporarily monopolizes the emotions. J.J.

TRANSCAUCASIAN, *trans kaw ka' shan*, **SOVIET FEDERATED SOCIALIST REPUBLIC**, comprising the republics of Armenia, Azerbaïdzhan, and Georgia, lying east of the Black Sea, was abolished by the constitution of December, 1936, each of the three states becoming a full-fledged member of the Union of Soviet Socialist Republics. A.P.

[Each of the foregoing states is described under its title. See, also, RUSSIA (Size and Location).]

TRANSCENDENTALISM, *tran sen den-tal iz'm*, a term applied to any philosophy, based on a spiritual interpretation of the universe, which makes absolute knowledge practicable. The term is associated particularly with the idealistic philosophy of Immanuel Kant, who distinguished between transcendentalism and the transcendent. Its original conception was that of Duns Scotus. Kant's ideas were taken up and expounded in England by Carlyle and Coleridge. Later, they inspired the movement in America known as New England Transcendentalism. Ralph Waldo Emerson was its most celebrated exponent, and others identified with it were William E. Channing, Margaret Fuller, George Ripley, Theodore Parker, and Henry D. Thoreau. The American Transcendentalists represented a reaction against Puritan philosophy.

The basic principle in their philosophy was the supremacy of mind over matter, and of the intuitions over tradition and established creeds. According to them, knowledge of all things beyond the boundaries of experience—such as religion—is revealed to the individual through his own consciousness. In fact, the formalism of the Unitarian Church was largely responsible for this movement. Followers in the movement were interested in social and political reform, as well as in religion and philosophy. Women's rights, temperance, prison reform, abolition of slavery, and vegetarianism were a few of the subjects they discussed. Their belief that a number of people could live happily together on a communistic plan was tested in the establishment of Brook Farm, near West Roxbury, Mass. (see BROOK FARM). Their ideas found published expression between 1840 and 1843 in a journal called *The Dial*, of which Emerson was the editor. It was Emerson who was responsible for the success of the movement.

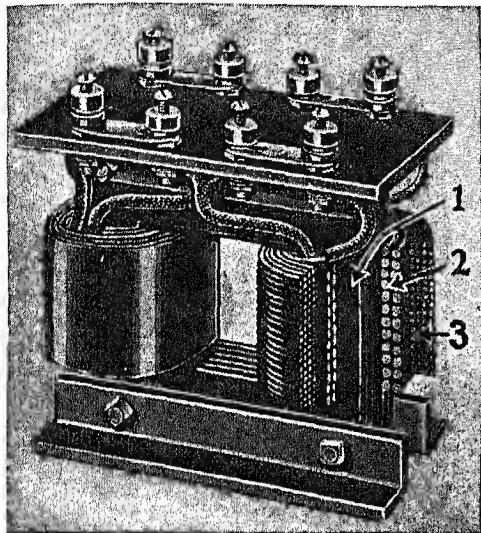
TRANSCONTINENTAL RAILROADS. See RAILROAD (Railroads in the United States).

TRANSEPT. See CATHEDRAL (Cathedral Architecture).

TRANSFIGURATION, THE. See illustration under JESUS CHRIST.

TRANSFORMATION OF ENERGY. See ENERGY, subhead.

TRANSFORMER. In carrying electricity from one point to another through wires, it is cheaper, and in other ways more desirable, to have a high voltage rather than a low one, and for actual work in lighting and in driving



A TRANSFORMER.

(1) Laminated iron core. (2) Primary circuit. (3) Secondary circuit.

machinery, only a low voltage is ordinarily practical. By the use of a device called a *transformer*, it is possible to generate a low voltage, increase it for transmission, and decrease it again for service. The principle of the transformer is simple. Faraday, in 1831, discovered that if a current is sent in alternating directions through a wire it causes an electromotive force in a near-by wire. Thus, if a hollow square, or core, of iron has the wires of one circuit wound around one side, and those of another circuit around the other, a transformer is created. If an alternating current is sent through the first circuit, it causes shifting lines of magnetic force, which induce in the other circuit an electromotive force in the other direction. In general, if there are twice as many loops of wire in the first as in the second coil, the voltage of the second coil will be cut in half and its amperage doubled. In some transformers, the core is outside of the coils.

H.S.E.

Related Subjects. A transformer is one form of *induction coil*. See the article on that subject, and those on

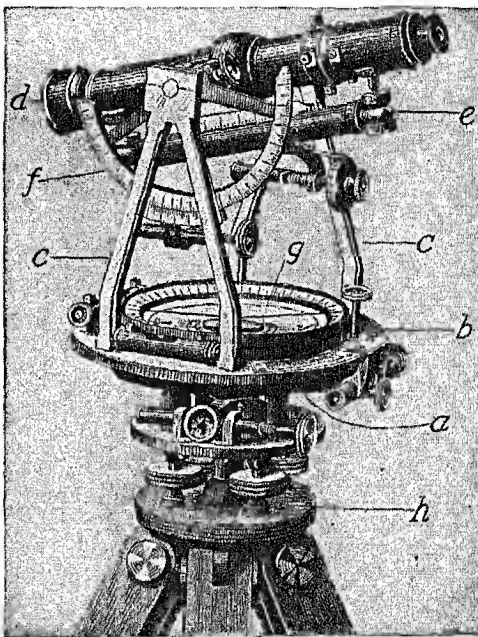
ELECTRICITY; AMPERE; VOLT; MAGNET AND MAGNETISM; DYNAMO; RADIO COMMUNICATION (Glossary of Radio Terms).

TRANSFUSION OF BLOOD. See BLOOD, subhead.

TRANSIT, in astronomy, the crossing of one heavenly body over the disc of a larger one, as seen from the earth. The transits of Venus and Mercury, whose orbits are between the sun and the earth's orbit, have been studied with great interest by astronomers. See discussion of these transits under MERCURY and VENUS.

F.B.I.

TRANSIT, the instrument most generally used by surveyors and civil engineers for measuring angles, determining bearings, and doing leveling. The chief parts of the transit are shown in the illustration. Two circular plates, *a* and *b*, usually of brass or copper, are mounted independently upon the same axis, so that the upper plate will revolve upon the lower. Supports, *c c*, are attached to the upper plate to support the telescope, *d*, which moves upon a horizontal axis. The level, *e*, is attached to



TRANSIT INSTRUMENT

The figure is explained in the text.

the telescope, and a graduated vertical circle, *f*, is attached to the axis. Beneath the telescope is a magnetic needle, *g*, which moves over a dial graduated in degrees, minutes, and seconds. The edge of the lower plate is also graduated, and the upper plate carries a pointer. Verniers are also attached to both the horizontal and vertical scales, so that the slightest movements can be easily read. There

are numerous other screws and lines for adjustment of the instrument, but their description is not essential to an understanding of its workings. The apparatus is attached by a toggle joint to a brass plate, *h*, which is fastened to the tripod. See SURVEYING; THEODOLITE.

TRANS-JORDAN (incorrectly, **TRANSJORDANIA**), so named because of its location across or beyond the Jordan River, in Western Asia, has been governed, since 1923, by an independent Arab administration subject to the control of the British mandate over Palestine, with the approval of the League of Nations. Before World War I and the successful revolt of the Arabians against Turkey, it was a Turkish governorship under the vilayet (province) of Damascus. Although its exact boundaries are not determined, it may be located by the countries surrounding it. Palestine, the Dead Sea, and the Jordan River lie to the west, and Syria to the north. To the east is Iraq (Mesopotamia), and to the south lie Hejaz and Nejd, in Saudi Arabia.

The population is about 300,000, of which more than 260,000 are Arab Moslems. There are about 30,000 Arab Christians of various sects, and 10,000 Circassians, the latter in colonies planted there by the Ottoman government, after the Russo-Turkish War of 1877-1878. Approximately half the population is nomadic, while the other half live in villages and small towns, chief of which are Amman, the capital, with 20,000 population; Es-Salt, Kerak, Irbid, and Maan. Most of the country is desert, almost the only arable region being a thirty-mile district between the Jordan River and the Hejaz railroad. Agriculture and cattle raising are the chief occupations; the recovery of salt, potash, and phosphate from the Dead Sea promises to become an important industry. A motor road extends from Amman to Jerusalem, and a portion of the Hejaz railroad runs through the country. The Cairo-Baghdad air route serves Amman.

History. For centuries, the sands of Asia Minor have shifted under the march of desert caravans and the tramp of conquering armies. It was an important part of the ancient world. Nomads in the time of the Jewish prophets wandered across the lands of Moab, Edom, and Gilead, which are now part of Trans-Jordan. Greek and Roman armies and colonists built flourishing outposts of their civilization there. It was the battleground of the soldiers of the Cross and of the Crescent, conquered first by the Moslems, then for many years a province of the French Crusaders. Saladin's brother captured Kerak in 1188, and after he became sultan of Egypt, there came a long succession of Egyptian rulers. From the sixteenth to the twentieth century, Turkish misrule laid waste the wealth of the country.

World War I and the resulting disorganization of the Turkish Empire presented an opportunity for Arabian independence. In April, 1918, the Bedouins, under the leadership of the Hashemite family, and inspired by the famous British officer and Orientalist, Colonel Lawrence, rebelled against the Turks. In September, 1918, the Turkish garrison of Maan surrendered to the British, marking the end of the Ottoman period, and by the Versailles Peace Treaty (1919), this territory was made part of the Palestine mandate under the supervision of the British High Commissioner of Palestine. During the revolt, the Hashemite family, the royal family of which King Hussein of Hejaz (later deposed) was the head, secured Great Britain's guaranty that the success of the rebellion would make Arabia independent. As a result of this promise and of the treaty, Emir Abdullah was approved by the British as ruler of the Trans-Jordan territory, with his capital at Amman and a money grant from the British to assist him in establishing an efficient administration. He is the son of the late King Hussein of Hejaz, and brother of the late King Feisal of Iraq (which see).

In May, 1923, local autonomy was formally granted to the territory, provided it should conform to constitutional principle, and receive the approval of the League of Nations. This condition was not fulfilled until later.

Trans-Jordan may now be considered as a practically independent nation, but it must remain subject to the conditions of the mandate over the country given to Great Britain by the League of Nations (see **MANDATED TERRITORIES**). British interests are lodged in the office of a High Commissioner; because of duties which pertain jointly to Trans-Jordan and Palestine, one High Commissioner serves for both countries.

In February, 1928, a treaty was signed between the British government and Abdullah, by which the independence of the Trans-Jordan government was formally recognized, but with stringent control in all departments of the administration. Later a legislative council composed of six officials and sixteen elected members was established.

There has been strife between Arabs and Jews in both Palestine and Trans-Jordan for many years. Some of the Bedouin tribes of Trans-Jordan were restless during the anti-Jewish troubles in the former territory in 1929, and there were also disorders in 1937. Trans-Jordan is covered by the Palestine mandate.

In August, 1939, a new agreement became effective, creating a cabinet of ministers directly responsible to the Emir, and removing restrictions over his power to raise and maintain military forces.

At the outbreak of World War II, Jewish and Arab factions in the mandated territories



Photo: U & U

IN PICTURESQUE TRANS-JORDAN

The terraced city of Es-Salt overlooks the Jordan Valley from one of the hills of Gilead.

supported Great Britain. The Emir Abdullah aided the British in 1941 when a pro-German faction in the neighboring government of Iraq illegally deposed the regent, Abdul Ilah, a nephew of the Emir, who then sought refuge with his uncle in Amman. The Trans-Jordan Arab Legion co-operated with British forces in ousting the pro-German faction in Iraq, and in restoring the legal regent. The Royal Air Force maintains units at bases at Amman and Maan. See ASIA (Map); WORLD WAR II (Hitler Thwarted in the Middle East).

Related Subjects. The reader is referred to:

Arabia	Hejaz	Nejd
Dead Sea	Jordan River	Palestine

TRANSMIGRATION OF THE SOUL, the belief that the soul, after the death of the body, passes into the bodies of lower animals or the bodies of other human beings, for purification. It presupposes immortality. Among the Brahmanic Hindus, it has its foundation in the idea of karma that as a man sows so must he also reap. Karma means that a person's deeds determine his destiny. If he lives like an animal he will come to earth again in the body of an animal, or as a vegetable, a plant, or a tree. If he has lived a fairly good life he will be reborn as a human being and will be

rich or poor, beautiful or ugly, high or low in the social scale, according to his character in his previous life. Born again and again, the man or woman at last works off the bad karma, and does penance for ignoble characteristics, until at last the soul is purified and may return to the ocean of God's spirit.

The belief in transmigration was found among many primitive peoples, and also in Greece and Egypt, in later times. Plato mentions it in his dialogues.

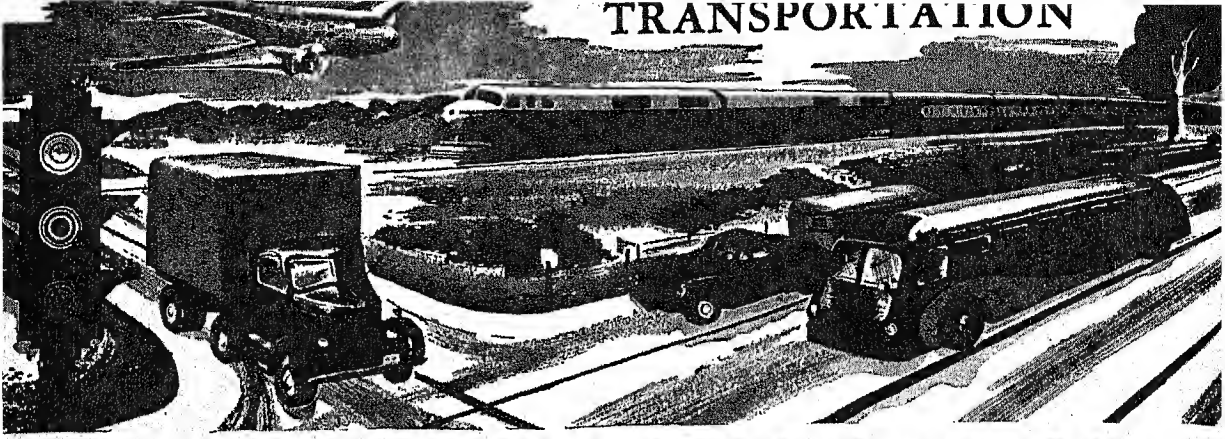
Buddhists, when they forgot the pure teachings of the Buddha, incorporated this theory of transmigration into their beliefs, and told wonderful stories of how heroes attained their perfection through many lives. They taught that the soul which conquers selfishness and becomes perfectly purified attains eternal life of Nirvana, the "peace beyond compare," and then rebirth on earth ends. See BUDDHA; BRAHMANISM. A.V.

TRANSMITTER. See TELEPHONE; RADIO COMMUNICATION.

TRANSMUTATION OF ELEMENTS. See ALCHEMY; CHEMISTRY (The Elements).

TRANSPIRATION. See EVAPORATION; LEAVES (The Work of the Leaf).

TRANSPLANTING. See TREE (Planting Trees).



TRANSPORTATION. Modern transportation has helped to make man master of land, sea, and air. Just as arteries carry life-giving blood to every part of the human body, so the means and methods of transportation make possible the kind of world in which man lives today. Main traffic arteries such as railroads, canals, highways, and rivers throb with activity night and day. Great air liners wing their way through the skies at amazing speed. Swift and powerful ocean "greyhounds" plow through the seven seas. Streamlined trains streak across the continent, and automobiles, trucks, busses, and other vehicles crowd the highways.

Like a powerful giant, transportation has widened man's horizons and drawn the peoples of the world closer together. It marks the triumph of man's inventive genius over time and space. Today, Mexico City is almost next door to Chicago; New York is just a stone's throw from London; Rangoon but a step from Tokyo. Transportation burrows through the steepest mountains and fords the swiftest streams. It enables man to do more things, go safely to more places, and to see more wonders than were even dreamed of two or three generations ago.

A country is backward or advanced, depending to a great extent upon the means of transportation at its command. Every phase of man's life has been affected by transportation—the food he eats, the clothes he wears, the homes he builds. Because of it, life on the farm and in the city has been completely changed. It has eased man's labors and given him more leisure time. If George Washington were alive today, he could fly from Washington, D. C., to New York after breakfast and be back in the capital in time for luncheon. Yet up to Washington's time, little progress had been made in the speed of transportation for thousands of years, although methods had changed.

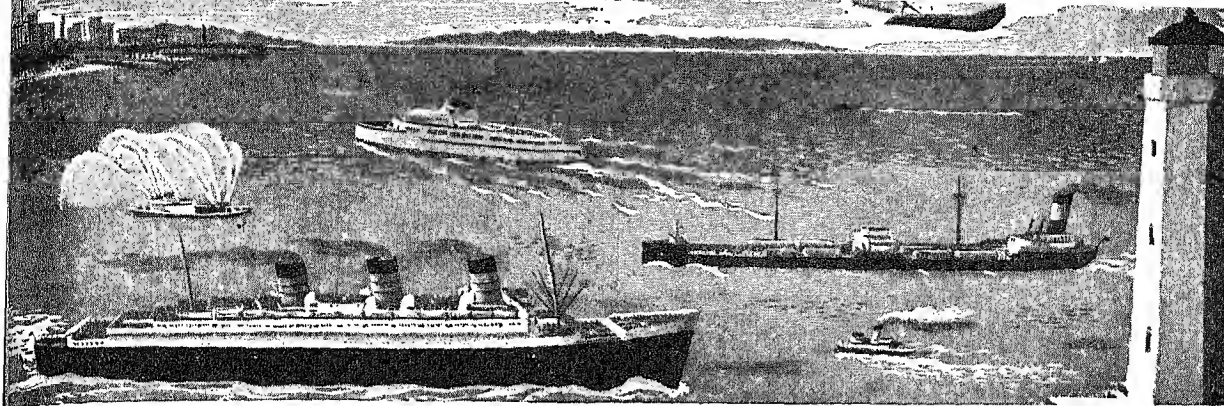
The story of transportation is that of man's upward struggle from an ignorant savage to a civilized person who is able to enjoy and appreciate the wonders of the twentieth century. It is difficult to realize that primitive man had no other transportation than his own two

feet. Ten thousand years ago, man lived in caves, wandered forth only in search of food and water, and carried his food home on his back. His very life depended upon his ability to compete with wild beasts and a cruel Nature. Had it not been for his greater intelligence, he might have perished. He attacked only those animals which he knew he could kill in a hand-to-hand fight. When man made a kill, he was always faced with the problem of getting it back to the shelter he called home. Usually, he carried it on his back or dragged it along the ground. Thousands and possibly hundreds of thousands of years have passed since those first halting steps in transportation were taken. Later, curiosity, the exchange of ideas with his fellowmen, and the trading of tools led to other steps. Advancement up to about a century ago was slow and gradual. Since then swift and amazing developments have brought undreamed-of advantages and progress.

Influence on Everyday Life

Modern transportation exerts an important influence on every phase of modern life. Swift means of travel have made it possible for people separated by vast oceans and mountains, and speaking different languages, to be interested in the same kinds of clothes, enjoy the same motion pictures, and conduct business in much the same way. Nations hardly can be strangers to each other when clipper planes and great liners speed across the oceans in less time than it took to go from New York to Pittsburgh when the United States was young. Even people in different counties and states have come to think of each other as next-door neighbors. Where once a journey of fifty miles was not to be lightly undertaken, today a journey of even five hundred miles or more is made as a matter of course.

This feeling of intimacy among people is world-wide in spite of wars. It has helped men to understand and be more thoughtful of their fellowmen. As a result, individuals, communities, states, nations, and even continents are becoming more and more dependent one upon the other. This is helping to unify nations and to bind the whole world together.



Standards of Living. Transportation means more than riding to school or to work on a bus or streetcar, taking a Sunday-afternoon automobile ride, or traveling by train and airplane. For example, a breakfast of fruit, cereal, toast, and coffee is about as simple a meal as possible. Yet, to provide it, often the food has been transported hundreds and sometimes thousands of miles. To prove this, add up the distances to the probable source of such foods as oranges, cereals, wheat for toasted bread, butter, coffee, sugar, milk, and salt. One hundred years ago, money hardly could buy such a breakfast. Today, modern transportation facilities include rapid, refrigerated or heated freight-car and truck services. Fresh vegetables, fruits, meats, sea foods, and dairy products can be had at any time of the year, in or out of season. This makes possible a better-balanced and more healthful diet. Sulphur and molasses is no longer a necessary spring tonic, such as the pioneers needed to tone up their systems after a winter of salted meats, fish, and dried vegetables.

Nowadays people throughout the world are very much alike. Many men and women in Egypt, Borneo, Iceland, and Argentina wear the same kinds of clothes as are worn in France, England, or the United States. In this country, where transportation is more varied and speedy, standards of living are higher than anywhere else in the world. Streamlined, air-conditioned travel on roads and railways, and mass-produced automobiles are available to more people than enjoy such comforts in other lands.

Trade and Commerce. Without transportation, the wheels of industry would soon come to a standstill. Regardless of how business is conducted, the product bought and sold is not always where it is needed. A bale of Alabama cotton, for example, is worthless unless it can be moved to a cotton mill to be manufactured into thread or cloth. Again, the cloth has little value unless there is some way to transport it to the purchaser. Transportation meets these needs of industry. Long freight trains, swift-moving trucks, and giant ocean liners speed farm and factory products to the market place. Workers, salesmen, and leaders of business

depend upon transportation. Without it, industry could not have developed as rapidly or grown to its present importance.

Agriculture. Farming, the world's oldest industry, is linked closely with means of transportation. As his knowledge in growing crops progressed, the farmer was able to produce not only what he needed for himself, but also surplus crops to sell to others. It was then, as in the case of industry, that methods of distribution became all-important. Without modern transportation, it would not be possible to market surplus farm products.

In the "horse-and-buggy" days, a farmer's journey to town was slow, over rough, rutty roads, almost impassable in winter. He could not spare the time to make the trip very often. Today, with his fast automobile and truck, he can drive to town on good roads every day, if need be, and still have time for his farm chores. Whether he makes his own deliveries of crops and livestock or has them picked up by a trucking company, his produce gets to market quickly, in good condition. The tractor makes plowing, harrowing, seeding, cultivating, and harvesting easier and quicker than was ever possible with a team of horses. The airplane is often used to spray cotton and other crops, and so destroy insect pests.

Best of all, transportation has helped to do away with the loneliness of the farmer's life, and it has raised his standard of living. Thanks to the automobile, he and his family are now so near town that they can join in social and civic activities with their town or city neighbors. Schools, libraries, drugstores, and motion pictures are truly just around the corner.

City Life. The whole life of a modern town and countless thousands outside it, depends on transportation. Any breakdown causes serious inconveniences to workers, shoppers, and heads of industry. Railroads, canals, and rivers bring to the centers of industry our great natural resources of coal, lumber, and iron. They have also affected the locations of towns. Before the coming of the railroads, the important towns were always found along the coasts and waterways. As the railroads spread, great natural resources became available to inland



ELEPHANT

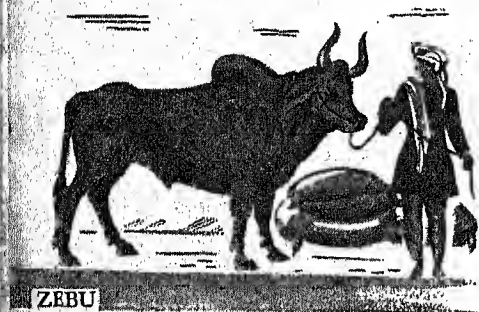


DONKEY

CAMEL



OX



ZEBU



YAK



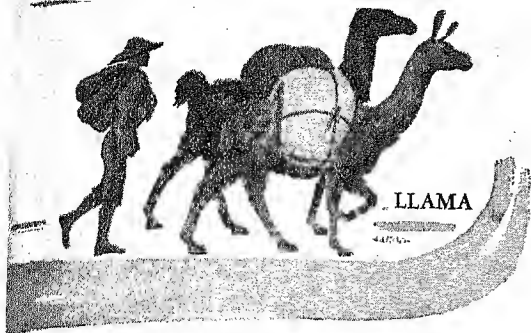
WATER BUFFALO

towns, and many of the river towns declined in importance. Industries followed and set up shops close to the tracks. Some were established in existing towns and others arose where there had been no towns before. All needed man power which was drawn from country, city, and far-off lands. Homes were built close to the plants and, as industry expanded, more people came and more homes were necessary, until every inch of space convenient to the plants had been used up. In many cities and towns the unhealthy crowding of human beings seemed unbelievable.

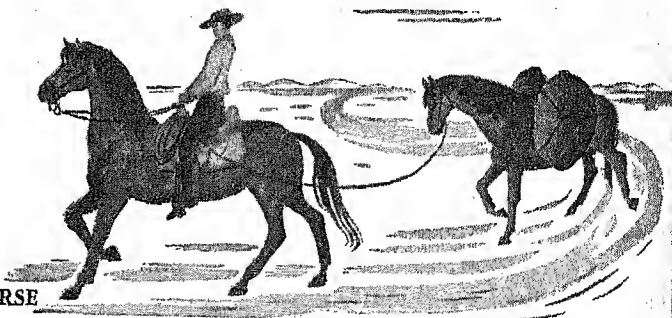
Then came the electric streetcar with its winding tracks stretching away to the city limits. It offered the workers cheap and rapid transportation to and from their places of work. It permitted them to get away from crowded living conditions downtown. The railroad soon followed with its suburban trains. Finally, came the automobile. Where the trolley car, elevated train, subway, and suburban train afforded the people a limited opportunity of finding pure air, and play areas for their children, the automobile further increased the opportunity. Many factories and office buildings still huddle about the railroad tracks and in the business centers of cities and towns. The workers, however, are scattered over a wide area, living a healthier and more contented life than before. Transportation has also made it possible and practical for city officials to provide for parks, recreation centers, and fine residential areas.

Communication. For a long time, communication was no faster than the means of transportation. In the United States, the story of speeding the delivery of the mails, and that of transportation are almost one and the same. Safe and rapid mail service is of vital importance to commerce and industry. As a result, one government after another has provided the necessary money for developing transportation agencies. This has been done in part by awarding special mail-carrying contracts. Without such aids, the ocean liner, the railroad, and airplane could not have reached their present stage of development.

Culture. The desire to travel is as natural to man as eating. From babyhood, he is filled with curiosity about other peoples, places, and things. These natural desires have led him to travel widely, and thus acquire knowledge of other languages, foods, customs, education, and religions. Whether man traveled to trade with or to conquer other peoples, he learned about their ways of life, and taught something to them. Civilization is based on culture, and culture is spread by transportation. It was the Romans who gave the Vikings their knowledge of sailing ships. Through Marco Polo, the king of medieval travelers, the various civilizations of eastern Asia were revealed to other parts of the world. His travels also



PACK HORSE



were an important link in the events leading to the voyages of Columbus and the discovery of America. At first, knowledge of art, religion, food, languages, or customs was spread wholly by actual contact between people. Such knowledge was limited to small areas; it was slow, and was available only to a few. With the invention of printing, aided greatly by transportation, the spread of knowledge widened to include practically the whole of mankind.

War. Transportation has brought many blessings, but it has brought evils too. The ocean liner has its match in the battleship, mine layer, and submarine. The speedy air liner has its counterpart in the bombing plane. The tractor, used to such advantage on the farm, in road building, and in industry, becomes in war the fighting tank. Transportation can thus be used to destroy wealth and friendship between nations as well as to create them. It has revolutionized modern warfare as completely as the long bow spelled the doom of the knight in armor. The "blitzkrieg" (lightning war) could not be waged without the speedy machines of modern transportation.

Transportation Aids. In times of disaster, speedy transportation is of the greatest importance in bringing relief to those who suffer. Throughout the ages man has been visited by plagues, famines, floods, and earthquakes, causing suffering, hunger, death, and destruction. Today, food, clothing, shelter, and medical services and supplies can be rushed quickly to stricken areas. In case of fire, modern transportation ensures that the fire engine will arrive speedily. Should an epidemic break out, serums and vaccines are rushed to the spot. In time of war, field hospitals bring first aid quickly. More and more, transportation is playing a part in such important work as patrolling the national forests, mapping the land by aerial photography, coastguard duties, and police work.

Transportation Workers. Not only has transportation assisted industry but it has also become an industry itself and has given rise to many new occupations. Government agencies estimate that there are more than 4,000,000 workers directly employed in transportation

services. There are probably as many more who give part of their time to similar services in connection with such industries as mining, manufacturing, and farming.

Epoch-making Developments

Man's life was much harder ten thousand years ago than it is today. As the years went by, he tried out many ways to save himself from as much physical labor as possible. He had a crude sled on which heavy objects and loads of food were dragged. He began to make progress in capturing, taming, and using wild animals. His whole life was changing from that of a wandering hunter to that of a more or less settled farmer tilling the soil.

Gradually, he began to use the dog, ox, ass, and horse as his beasts of burden. These were used in Egypt and Mesopotamia as long as four thousand years ago. Other animals were made to serve the purposes of man in various parts of the world. Most common among them were dogs used by the Eskimos and North American Indians; the camel of the desert countries; the reindeer of the Far North; the elephant of India; the yak of China and Tibet; the water buffalo of Malaya; and the llama of Peru. These animals are still used today in various parts of the world.

Wheel. It was not until about 7000 B.C., that man took the first great forward step in transportation with the invention of the wheel. The wheel and axle were evolved from the sled and rollers. They were quite simple and were probably nothing more than rough discs of wood fastened to each end of a small roller. The name of the inventor and the race to which he belonged are lost in the mists of antiquity. The Greeks claim it was Athena, their goddess of handicrafts. Regardless, however, of whom the inventor was, the wheel has continued through the ages. It has been, and still is, indispensable to man, not only in transportation, but in all industry as well. There must have been a cart to go with the wheel and axle, although no one knows what it looked like. A fair guess would be that it had a raft-like floor of saplings tied together with grass rope, four wheels with the roller axles held

crosswise, and a tongue at one end. One of the oldest vehicles now preserved is an Egyptian chariot of about 2000 B.C. Its wheels are roughly like those of today, with hub, spokes, felloes (wooden rim sections supported by the spokes), and rim. To this chariot can be traced many of the wheeled vehicles of succeeding centuries. They include Greek and Roman chariots for hunting and war, farm carts and wagons, stagecoaches, carriages, gigs, hansoms, cabs, Conestoga wagons, bicycles, railroad cars, and automobiles. See **WHEEL AND AXLE**.

Ships and Sails. Long before man had carts and domestic animals, he had enjoyed the thrill of riding downstream on a raft. The idea probably came to him through watching a drifting log. Finding that straddling a single log in the water was dangerous, he tied several logs together. While the raft served his purposes for a long time, man continued his experiments with the single log. He made little progress, however, until he had learned to use fire, sharp-edged stone axes, and stone scrapers. With their help he produced the hollow log, or dugout boat. That invention may be as much as ten or twelve thousand years old, for the Egyptians used sailboats on the Nile at least eight thousand years ago.

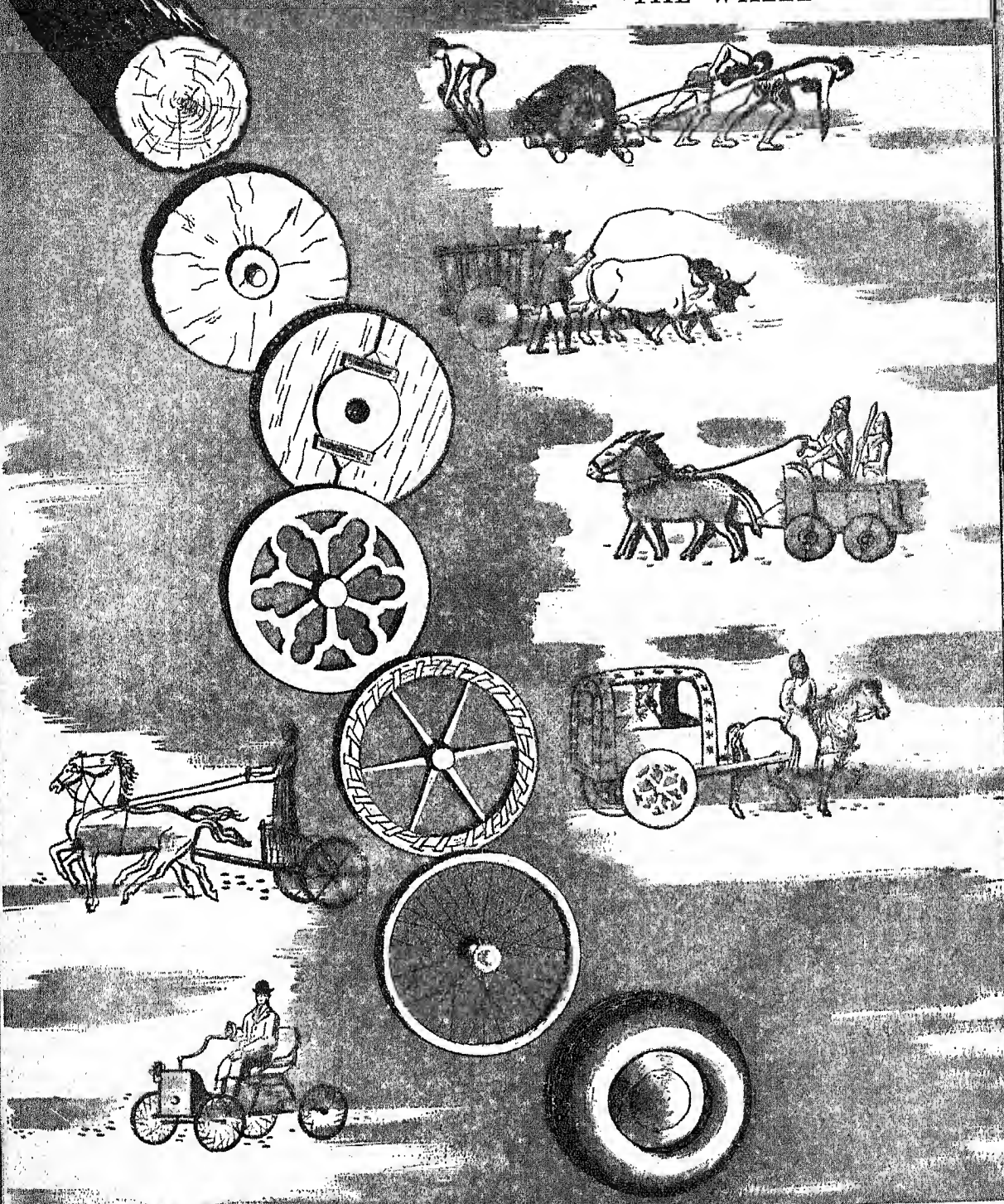
For five thousand years all improvements in watercraft were made by the Egyptians. They progressed from the simple, hollow-log boat to the ship built of planks secured to a wood framework or skeleton, somewhat like the ship of today. With their sturdy vessels the Egyptians became the first sea-going nation. The Phoenicians followed them and produced a quick-handling war vessel, or galley. This was propelled by oars and manned by slaves, with a single row of oars from bow to stern. Later, they built the *bireme*, a speedier ship with two tiers of oars, one above the other. From that they developed the *trireme*, or three-tiered vessel. With such ships the Phoenicians became masters of the sea, and the world's greatest maritime nation. For merchant service they used sailboats, in which they ventured out of the Mediterranean Sea into the Atlantic through the Straits of Gibraltar. It is known that they sailed as far as the British Isles and Scandinavia. The use of sails, although not completely replacing oars for many years, was eventually to make galley slaves unnecessary. These early sails were placed across the ship and were not used as they are today. Later, the Greeks built ships with ten tiers of oars and perhaps many more. Like the Phoenicians, they also used sails and went far beyond the Mediterranean. Thereafter, and throughout the Christian era, the development of the sailing ship was continued through the contributions of all civilized nations. Ships became longer, broader, and higher than before. More

masts were added. New designs of hulls and sails were introduced. See **SHIP**.

Compass. Of the greatest importance to sea travel was the invention of the compass (which see). Up to that time, seafarers had sailed close to land, following the coastlines for safety. On clear nights, they steered a course by the stars. With the compass to guide them, the uncertainty of becoming lost at sea by day or night was removed. Though there are vague records of its use in the twelfth and thirteenth centuries by the Chinese and Arabs, the compass was not commonly used for navigation by Europeans until early in the fifteenth century. To Christopher Columbus belongs the credit of removing all doubt of its value. Strangely enough, the inventor of the compass remains unknown.

Steam Engine. Until the close of the seventeenth century man was wholly dependent on the natural forces about him, such as water, wind, and animal power, as aids of transportation. In the eighteenth century, however, was developed the steam engine, a new, artificial agent of power, bringing great changes. For one thousand years or more there had been talk about steam. No one, however, seemed able to control it or put it to useful work until 1712, when Thomas Newcomen of England perfected the atmospheric steam engine. In 1769, James Watt (which see) corrected many of the faults of Newcomen's machine and produced the first practical steam engine. As soon as the value of Watt's invention became known, experimenters in the more advanced nations of the world began studying it and applying its power in many ways. Some of the earliest experiments were in the field of transportation, first in England and then in the United States. Within fifty years steam-driven coaches were replacing the horse-drawn ones in use on the highways. Steamboats were taking the place of sailing ships, and an iron monster, belching fire and smoke, was hissing along rails over the land. The power and speed of these monster locomotives at first inspired awe and fear, but people soon became used to them, and the railroad was an established fact. See **STEAM ENGINE**.

Screw Propeller. Another event of great importance to sea travel was the introduction of the screw propeller. It came after steam engines had been adapted to ships, and as a substitute for paddle wheels. The principle was not new, having been used for centuries before in water wheels and windmills. About 1835, John Ericsson (which see), a young Swede, then residing in England, succeeded in interesting a visiting captain of the United States Navy in the idea of a screw propeller for steamships. With the captain's financial help, a steam vessel seventy feet long was constructed of iron and equipped with Ericsson's



Primitive man took the first step toward the development of the wheel when he used logs to help roll heavy loads from one place to another. From the sled and rollers, a simple wheel and axle were later fashioned by fastening sections of a log to each end of a small roller. Crude wheels of this kind are still used in various parts of the world. In ancient Babylon, wooden wheels with rims of copper have been found in the tombs unearthed at the city of Kish, Iraq. The Babylonians also used wheels from which excess wood had been cut, making a lighter wheel with spokes. The Egyptians used a wheel with a leather rim tied on with thongs of rawhide. The racing and war chariots of the Babylonians, Egyptians, Greeks, and Romans all had highly developed wheels. Most important of the wheels developed in the nineteenth century was the one with wire spokes invented in 1869. The first "horseless carriage" used this type, and from it has developed the automobile wheel of today with its springy, air-filled rubber tires. The wheel is also used by airplanes in "taking off" and landing.

screw propeller. In 1839, when completed, the vessel crossed the Atlantic under sail rather than steam, because of the risks involved with untried screw propulsion on the high seas. Very soon after its arrival in the United States, however, it went into service as a screw-propelled steam tug on the Delaware and Schuylkill rivers in Pennsylvania. Its success led immediately to the construction of larger passenger vessels for transatlantic service, equipped with screw propellers rather than paddle wheels. The first of them was the *Great Britain*, launched in 1843. With its success, the paddle wheel was gradually replaced by the screw propeller. See PROPELLER.

Electric Motor. Transportation in cities has always been a serious problem, owing to crowded conditions. In earlier days, conditions were improved by having hackney coaches and omnibuses follow definite routes. As the cities grew, the street railway with horse-drawn cars came into use, but it, too, proved inadequate. The problem remained unsolved until the electric motor (which see) was invented and adapted, as was the steam engine, for purposes of transportation. The electric railway (which see), using the same kind of tracks as the old horse-drawn cars and overhead cables, was the result. Because of its speed, power, and cleanliness, the electric streetcar was quickly approved and put into service in all large cities of the world. The electric motor was later adapted for use on elevated railways, subways, and elevators.

Internal Combustion Engine. One modern power agent, the latest, has yet to reveal all its possibilities. This is the internal combustion engine (see GAS ENGINE). The application of its power to a horse-drawn vehicle led to the development of the "horseless carriage," or automobile. This invention brought to an end the "horse-and-buggy" days, and began the present era of transportation services of every kind on land, on water, in industry, in the air, and underground.

Engineering Science. Running parallel with all these events which revolutionized transportation was the development of roads, canals, bridges, and tunnels (which see). All these have passed through gradual stages of improvement, just as have the vehicles which use them. The Romans were the first to recognize the value of good roads, chiefly for their military aid in the movement of troops. Wherever the Roman armies went, highways were constructed, some of which are still in existence. As commerce increased, and more vehicles came into use, engineers and scientists helped to build better roads, bridges, and tunnels than ever before.

Transportation in the United States

For centuries before the coming of the white man, the only transportation in North America

was that used by the Indian. On land, he usually walked, with the dog serving as his beast of burden. At first his only vehicle of transportation was the *travois*. This consisted of two poles tied together at one end and fastened to a grass or hide rope. This was slung over the backs of dogs or horses. The other two ends dragged along on the ground. Across the poles was a platform of sticks upon which the Indian placed his children or belongings. Along the rivers, dugouts and birchbark canoes offered a swifter means of transportation.

Colonial Days. The colonists who arrived from Europe during the seventeenth century found little or nothing in the way of transportation. Where they had come from, there were roads and all sorts of wheeled vehicles. However, as the colonists became more thickly settled along the Atlantic Coast, and commerce increased, Indian trails or paths became the main land-travel routes. Along them could be seen an ever-increasing traffic of pack-horse trains and individual travelers on foot and on horseback. Women usually rode "pillion" with their husbands, that is, on a cushioned seat behind the rider. The colonists had wheelwrights among them who could have built simple wheeled vehicles, but there were no roads on which to use them. Throughout the seventeenth century, however, great strides were made in the preparation of highways by widening the paths. As rapidly as the roads became passable, vehicles appeared, such as primitive two-wheeled carts, three-wheeled wheelbarrows, and rough four-wheeled wagons.

So rapid was this progress that by 1700 a few European coaches had been imported and put to use. The two-wheeled chaise had been developed, and in New York City a hacking service had been started. Stage wagons and stagecoaches made their appearance early in the eighteenth century. They carried freight, and also passengers, should anyone care to ride with barrels of flour and bundles of hides. By 1730, stage lines were running on regular schedules, one of the earliest operating between Burlington and Amboy, N. J., once a week each way.

As public travel increased, the wealthier stage-line owners improved their coaches, lengthened the distance of their runs, and increased the speed of travel. One of the fastest of these lines in 1771 made three trips a week each way between New York and Philadelphia in one and one-half days. By 1800, stage lines had been established as far west as Indiana. That trip was a hard one, however, in a springless wagon over the roughest kind of roads. It required two weeks' time, riding sixteen hours a day, and cost sixty-five dollars for coach fare, board, and lodging on the way. The most famous stagecoach in the East toward the end of the eighteenth century was the

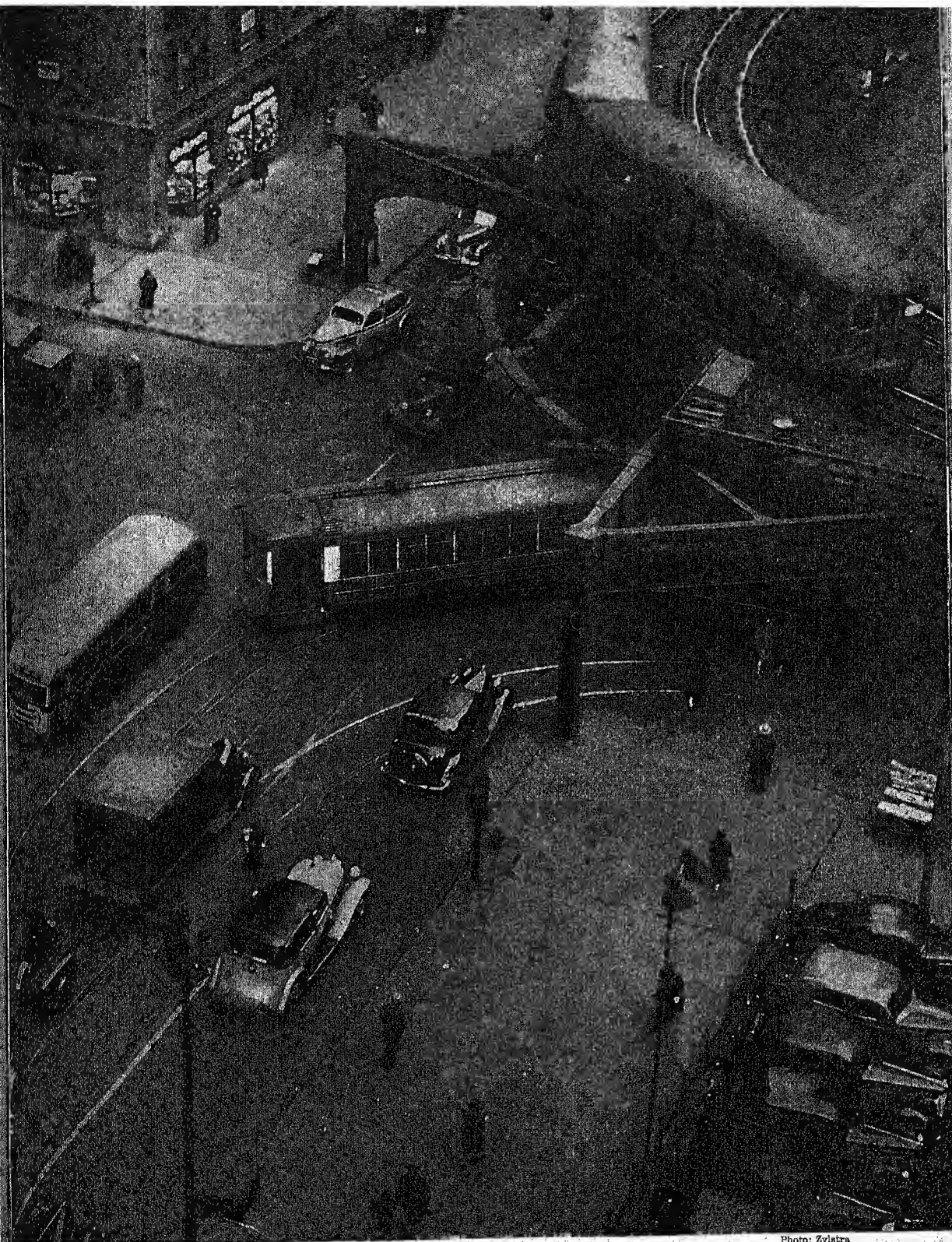


Photo: Zylstra

TRANSPORTATION FACILITIES IN A LARGE AMERICAN CITY

Since the development and adaptation of the electric motor and gasoline engine, various modes of transportation have been provided for the convenience of city dwellers and business people. In this scene of a busy Chicago street intersection, may be seen an elevated train rounding a corner of the Loop district. Also note the street-car, bus, taxis, truck, delivery wagon, motorcycle and sidecar, and many automobiles. The parking lot (lower right) helps to provide adequate parking space, which is always a problem to be solved in a congested city.

"Concord Coach," so-called because it was built in Concord, N. H. It was fairly comfortable, for the body was slung on strong leather straps.

Many of the earliest American colonists were shipwrights, fishermen, and seafaring men. It was but natural, therefore, that there should be much shipbuilding, fishing, and coastwise trade. With plenty of wood available, the shipwrights built small but sturdy vessels patterned after the familiar ships of the mother country. In due time, however, designs of ships were adapted especially to coastal fishing and trading, as well as to tidewater river navigation and commerce. Of these the most famous were the schooner and the Baltimore clipper. Even before the Revolutionary War, ships built in New England were known in European, Mediterranean, and West Indies ports. New England ships sailed to the West Indies with molasses and exchanged it there for rum. The rum was taken to Africa and traded for slaves. They, in turn, were brought to the New World and sold.

Travel by Water. From the earliest colonial days there had been restless men who had started migrating inland away from the coast. Before and after the Revolution, more and more men, women, and children followed the trails blazed by such leaders as Daniel Boone. On foot and with pack horses they traveled westward. There was no thought of using wheeled vehicles. Once over the mountains, the travelers took to the rivers, which were then the great highways to the West. The Ohio River with its strong currents was one of the main waterways. At first the earliest colonists drifted down its course in canoes. A canoe in midstream, however, proved too easy a target for hostile Indians, so the people came to use rafts or flatboats. Then with whole families aboard, as well as supplies and livestock, fleets of these flatboats floated together down the Ohio to the Mississippi. All along the route, at likely looking spots to settle, families steered their flatboats to the shore, broke them up, and built their homes out of the lumber.

Back East, as commerce and trade expanded, the overland transportation facilities could not meet the traffic demands made upon them. Canals (which see) were then constructed. For many years boats towed along their courses carried much of the freight and produce between inland and coastal cities. The most famous was the Erie Canal (which see) completed in 1825, linking the Great Lakes with the Atlantic Ocean. For twenty-five years it played an important part in opening up to trade and commerce the great areas along its route across New York State.

As settlements were established along the Ohio and Mississippi rivers, supplies from the East were in great demand. Traders, using

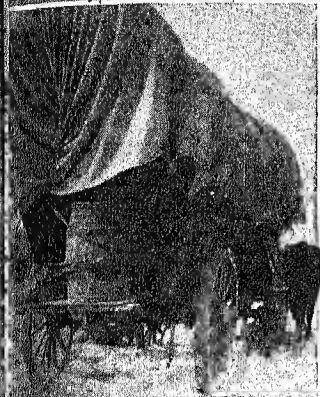
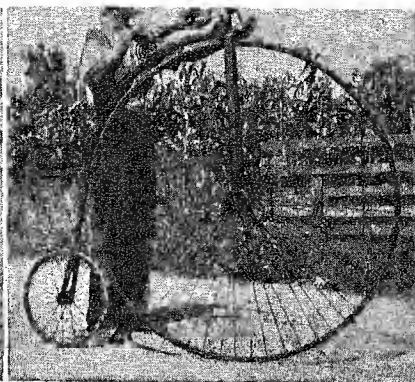
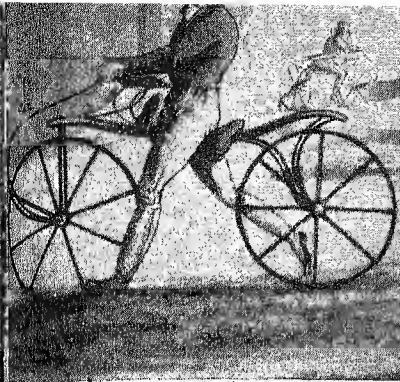
flatboats loaded with goods, drifted all the way from Pittsburgh to New Orleans, selling their goods as they went. Getting back upstream was a difficult problem. The flatboats were not built to buck the strong currents, nor was there any way of propelling them. For a time the traders sold their boats at New Orleans and made their way back overland. The difficulties of this journey finally brought about the invention of the keelboat which could navigate the rivers both ways. These boats were simply square-end barges with a low housing over them, a narrow walkway along each side, and a keel running the length of the bottom. With the keel to give steerage way, men could propel such a boat upstream with the aid of long poles. Much of the produce of the earliest settlements along the rivers was shipped East by keelboat.

In 1807 came a new era in transportation when Robert Fulton (which see) showed that the steamboat was practicable and commercially profitable. Few who watched that first demonstration could have foreseen a time when hundreds of steamship lines would mark out countless ribbons of traffic lanes around the earth. Four years later, in 1811, Nicholas Roosevelt built and launched the steamboat *New Orleans* on the Ohio River at Pittsburgh. He started the era of steamboat navigation on inland rivers and lakes, which later had such an important effect on the settling of the West.

First Federal Highway. During this period of westward migration, between the close of the Revolution and the early part of the nineteenth century, the whole thought of the people was to settle somewhere, anywhere, in the vast wilderness beyond the mountains. The manner of getting there was of small importance. Anything would do. Later, the necessity for better means of transportation between various sections of the country became acute. The urgent need of providing better overland routes to the centers of commerce in the East became the main subject of public discussion.

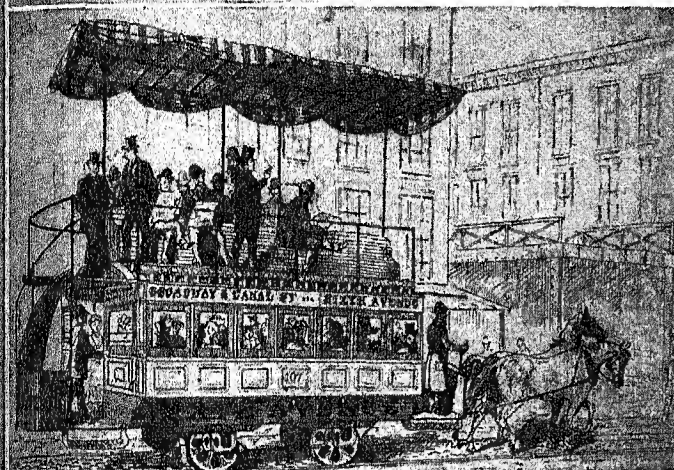
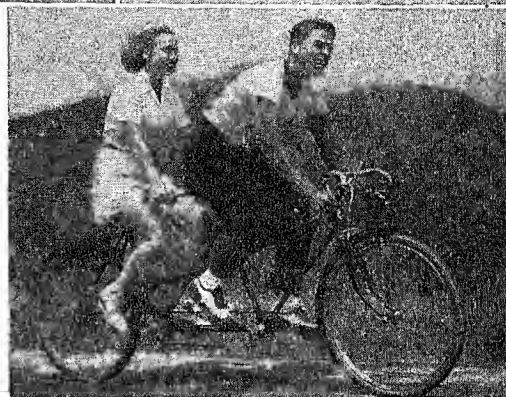
By 1802, the first congressional act was passed giving the Government power to undertake road improvement. As a result, the National, or Cumberland Road (which see) leading to the West from Cumberland, Md., was begun in 1808. By 1817 it had reached the settlements in Ohio, and in another ten years had been extended through the Mississippi Valley as far as Vandalia, Ill. Until about 1850, the Cumberland Road remained the main traffic artery from the East to the Mississippi Valley. Back and forth over this highway was to be seen an almost endless stream of stage-coaches and freight wagons carrying, at a far more rapid pace than ever before, traders, settlers, mail, and freight.

Conestoga Wagon. Almost every kind of vehicle was in use on the Cumberland Road, the most serviceable of all being the white,



Upper left: During the early nineteenth century, the hobbyhorse, or "swift-walker," forerunner of the bicycle, was in common use. It was propelled by pushing the feet against the ground. *Above:* About 1873, the English developed the "ordinary," or "penny-farthing" named after two coins one of which, the farthing, was much smaller than the penny. The ordinary had crank and pedals fitted to the big front wheel. *Upper right:* In the eighties and nineties, the tandem tricycle with solid rubber tires was popular. *Second right:* A tandem bicycle of today. *Left:* An ox-drawn prairie schooner of the sixties.

Photos: Smithsonian Institution; Paul; Brown Bros.; Kaufmann-Fabry; Globe

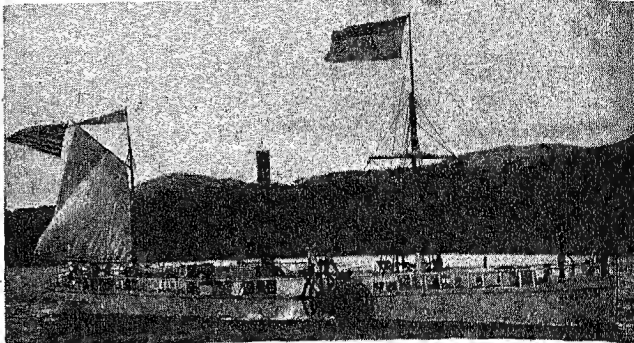
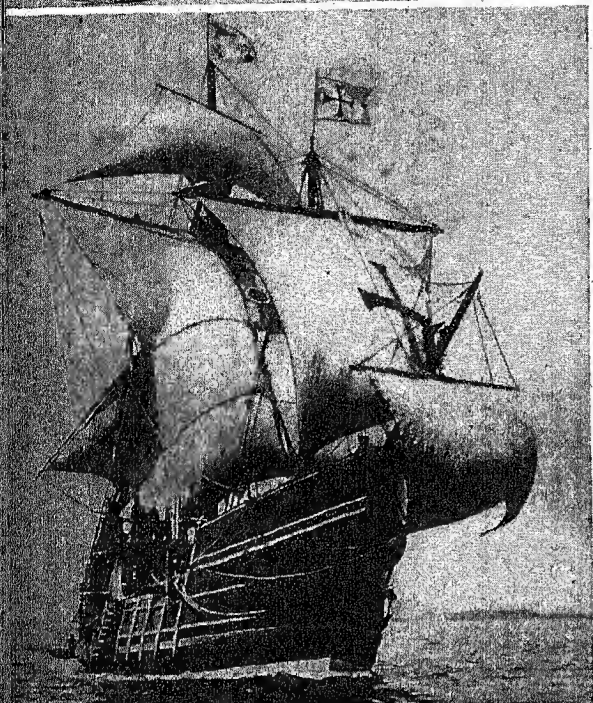
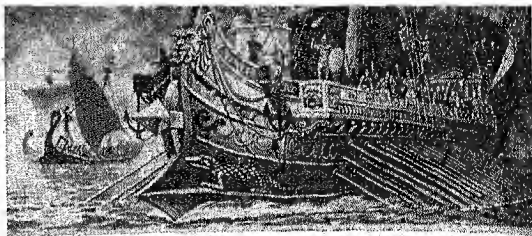
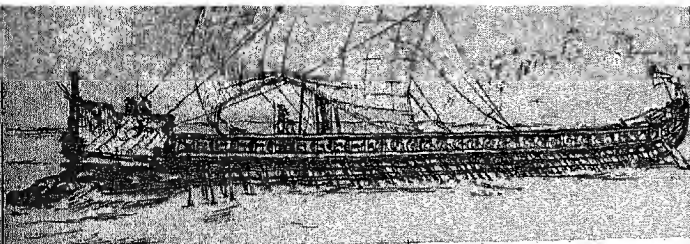


WHEELED VEHICLES WITHOUT ENGINES

Above: One of the double-decked horsecars used on Broadway, New York City, in the eighties. *Third right:* A horse-drawn wagon long in use on American farms. *Below:* The two-wheeled hansom, city taxicab of pre-automobile days. *Lower right:* The horse and buggy widely used before the coming of cars and good roads.

Photos: Keystone; Brown Bros.

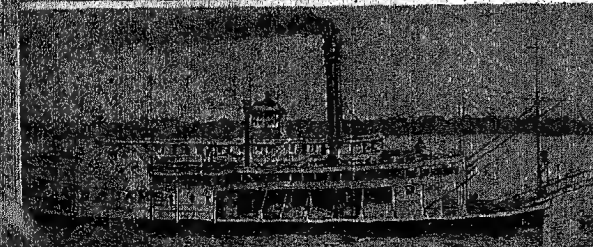
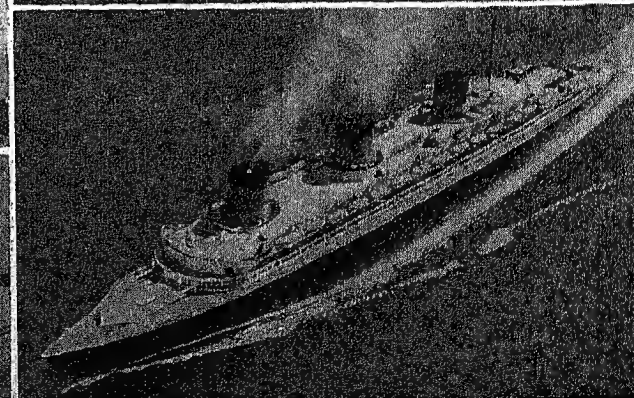
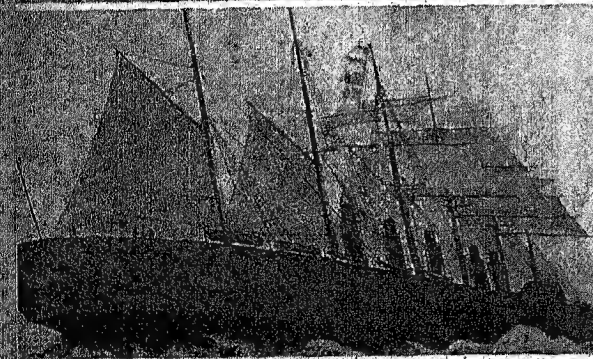
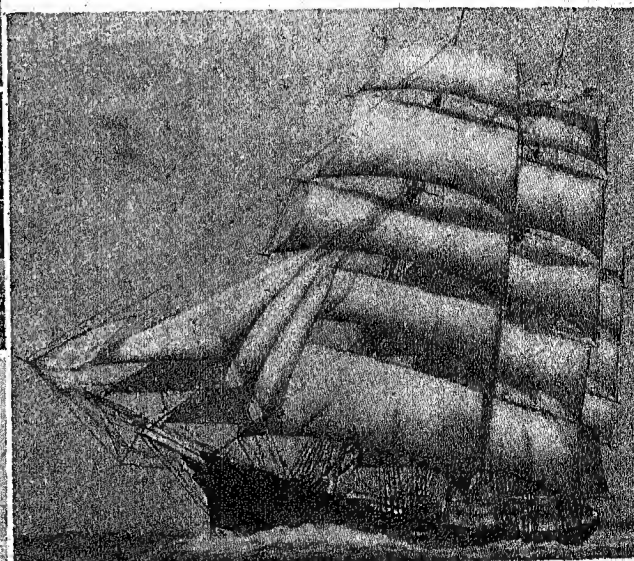




WATER TRANSPORTATION

Upper left: An oared galley of ancient Greece. *Upper right:* A Roman galley with three rows of oars. *Second left:* The "Santa Maria" in which Columbus sailed to the New World in 1492. *Above:* The "Clermont," which made the first successful steamboat trip in 1807. *Third left:* A passenger boat used on the Erie Canal about 1830. *Below:* The "Flying Cloud," famous clipper ship built in 1850. *Fourth left:* The "Great Eastern" built in 1858, four times larger than any previous boat, used to lay the first transatlantic cable. *Fifth left:* A Mississippi side-wheeler of Mark Twain's days. *Lower right:* A modern liner.

Photos: Smithsonian Institution; Brown Bros.; Black Star; Kaufmann-Fabry; James Sawdars



canvas-covered Conestoga wagon. This was a lumbering vehicle with a long, deep body sagging in the middle. It could carry a load of from two to four tons. In the larger wagons, the top ends of the body were as much as sixteen feet apart. The tops of the wooden curved bows supporting the white cover were eleven feet above the ground. The rear wheels were five to six feet in diameter, and the cover was twenty-four feet long. With a six-horse-team pulling, the overall length of the wagon and team was about sixty feet. Until 1850 most of the freight and passengers were transported to the West and back in these vehicles and their smaller, lighter cousins, the so-called "prairie schooners."

Packet Ships. After the War of 1776, the restrictions on foreign trade imposed by England, together with the dangers of encounters with pirates, caused American ship designers to undertake the construction of ships having great speed, but still possessing a reasonable cargo space. By 1815, American ships had passed from clumsy hulks to the ablest, smartest, and speediest vessels in the world. They were followed by the American-built packet ships, so fast, so comfortable for passengers, and so regular in their schedules, that they gained almost a monopoly of the passenger, mail, and express traffic to Europe. Until 1845, they were the swiftest vessels on the seven seas.

China Clippers. Soon after news of the discovery of gold in California reached the East people began to demand ships that would get them there quicker than was possible overland. To meet the demand for this business "around the Horn," as well as for the very profitable China tea trade, the clipper ship was developed from the packet. These great white-winged ships proved to be the highest achievement of American builders. Their size, speed, and performance were remarkable. Passengers could count on making the trip from New York to San Francisco in about three months. Even more important, the clipper ship brought the East to the West, and made the West real to the East.

The Railroad. The coming of the steam railroad (see RAILROAD) in the early 1830's was an event of the greatest importance to the United States. As it was extended westward to the Mississippi, the land was speedily settled. Industries were established close to the tracks, and shipment of products between the new settlements and the older communities of the East were made easy.

Just as there were people earlier who had been curious to find out what lay beyond the Allegheny Mountains, so now there were others who wanted to know what lay to the west of the Mississippi. The tales these adventurers told about the richness of the plains, vast herds

of buffaloes, and the mountains beyond, started further migrations of settlers. There was a demand for better transportation and communication. As a result, well-organized stagecoach lines were established and bolder men talked of a railroad all the way across the country.

With the discovery of gold in California in 1848, the need for such a railroad became clearer than ever before. It was not until 1869, however, that the first transcontinental railroad, stretching from the Atlantic to the Pacific, was completed at Promontory Point, Utah. There the Central Pacific Railroad, pushing eastward from California, met the Union Pacific Railroad building westward from Omaha. Within sixteen years, four transcontinental lines had been completed, binding the East and the West together. Nothing so changed the United States as did the transcontinental railroad. Towns sprang up like mushrooms. The Indian fled and the buffalo disappeared. Unknown resources came to light. Wheat was raised on the open plains. "Go West" became a byword in the crowded East, as well as in Europe, and people hastened to settle the open spaces.

In 1803, Thomas Jefferson is said to have stated that it would take a thousand years for the section of the United States west of the Mississippi River to be fully settled. Less than a hundred years after Jefferson's remark, a network of railroads had practically covered the land, and many people believed that the United States had progressed as far as was possible. They gave little thought to the possibilities of that amusing "contraption," the horseless carriage.

Automobile. About the beginning of the twentieth century there appeared an unusual-looking vehicle resembling the familiar phaeton, but minus shafts and whip socket. The automobile (which see) as it was later called, brought about social changes little dreamed of in 1900. At first the occasional machine chugging along the streets simply created an interesting topic of conversation. People continued to travel by train or streetcar. Horse drays did the trucking for all industry. Merchants made deliveries by horse and wagon. For pleasure, people used bicycles and the horse and buggy. During the second decade of the twentieth century, however, mass production of automobiles began, making it possible for people of average means to own and operate them. People experienced greater freedom than they had ever had with the bicycle, train, or trolley. Traveling twenty-five miles by car took no longer than two or three miles had taken formerly. Distances became unimportant. Industries and public utilities took up the automobile, and provided busses and trucks. More and better-surfaced roads followed. Industry is no longer compelled to crowd along

railroad tracks. With the automobile has come a new distribution of people, with an even greater opportunity for unity than ever before.

Airplane. The thrill of speed which the automobile and railroad train provided brought about the demand for even more speed. For centuries man had dreamed of flying like the birds, but his dream did not come true until the early 1900's. When flying became common man turned his attention more and more to greater speed. The airplane (see AIRCRAFT), the most recent agency of transportation, has increased the pace of daily life, has speeded up communication through the air-mail service, and is rapidly becoming indispensable to industry and commerce. A great network of air lines serves the country from the Atlantic to the Pacific and from the Great Lakes to the Gulf of Mexico, affording a high degree of comfort, speed, and safety.

Diesel Engine. The streamlined train first made people conscious of the Diesel engine (which see). It is similar to the gasoline engine except that it burns fuel oil instead of gasoline, has fewer parts, and is more economical to operate. For the first thirty years of its life, since 1898, its sole use was for stationary power purposes. Gradually, however, the engine was made lighter and was designed to operate at higher speeds. As a result, it entered the transportation field. In 1925 came the first Diesel locomotive. Five years later Diesel trucks were in operation on the highways of the western states. In 1932 the Diesel tractor was put to use on farms; and in 1934 came the Diesel-powered streamlined trains.

Pipes and Lines. There are many other transportation agencies at work twenty-four hours a day. The greatest of these are the pipe-line systems, many of which are buried underground for the transportation of oil and gas. There are today more than 110,000 miles of pipe lines in the United States, carrying crude petroleum and some of its products from the wells to the refineries. Some of the oil moves but a short distance; some is carried as far as 1,500 miles. The systems are much more than just a line of pipe in the ground. They involve storage tanks at the oil fields, power plants, pumping stations at intervals, and systems of communication all along the lines. If, as in the early days, people had to depend on tank cars hauled by railroad locomotives to transport petroleum, the cost of gasoline for automobiles would be considerably higher. Merchants, farmers, and industrialists would have to charge more for their products. Pipe lines today not only transport crude petroleum and gasoline, but also other refined products. Tests show that pipe lines are equally capable of transporting pulverized coal and small grain satisfactorily.

The simple act of turning on a water faucet

sets in motion elaborate and extensive transportation machinery for conveying water. The source of supply may be near by, or it may be hundreds of miles distant, requiring great pipe lines and aqueducts to transport it. Switching on the electric light also means miles and miles of power lines along which electricity flows to the consumer.

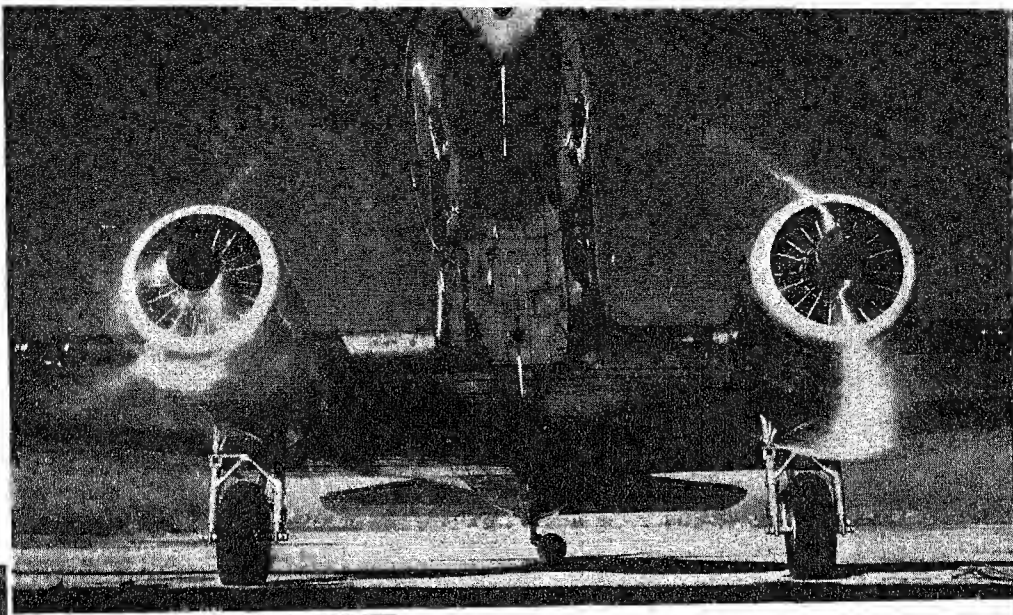
Speed and Comfort. About one hundred years ago, the freight caravan of ox-drawn prairie schooners required five months to make the journey from St. Joseph, Mo., to San Francisco. Today automobile trucks and trains make freight deliveries in San Francisco on the fifth day after leaving Kansas City. One hundred years ago the fastest time made by overland stagecoach lines carrying passengers and mail between Kansas City and San Francisco was twenty-five days. Today steam trains make the journey in about two days. Streamliners make the journey from Chicago to San Francisco in less than forty hours. It is possible also to fly in a commercial airplane from Kansas City to San Francisco in a few hours.

It took Columbus with his three tiny ships seventy days to sail from Spain to the West Indies. Today the fastest transatlantic liners can cover the distance in less than four days. A transatlantic clipper plane can fly it in about twenty-four hours. Columbus set out with three ships because he expected one third of his men to die on the way over and another third to be lost on the return journey, leaving just enough men to bring one ship home. The traveler in a modern ocean liner has little cause to be afraid of the sea. He may enjoy beautiful lounges, libraries, and winter gardens; sleep in beds instead of berths; swim in a pool; attend motion pictures; and have elevator service to take him from one deck to another. Columbus depended on wind for power. Today, power equal to that of 200,000 horses makes the super ocean liner independent of the weather.

Superhighways. One of the striking contributions to transportation in recent years is the express highway for automobiles. There are no intersections with other roads, and unlimited speeds are permitted. Such highways were first developed in Italy and Germany as part of their national defense systems. In the United States, an express highway of this kind, the Pittsburgh-Harrisburg Turnpike, was constructed in Pennsylvania and opened to traffic in 1940. The highway follows an unused railroad route through the mountains of southwestern Pennsylvania, on which work was begun in the eighties and later abandoned.

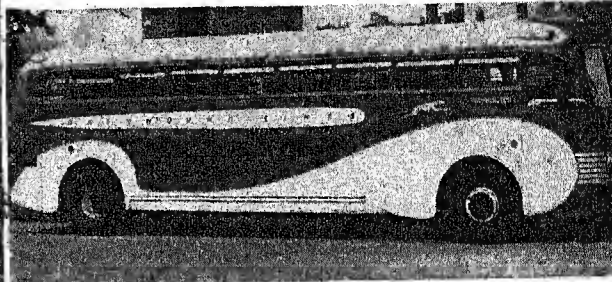
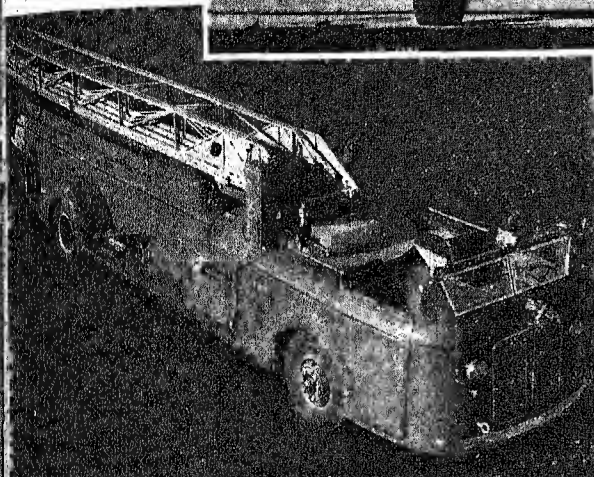
Transportation in Other Lands

There are hardly any countries in the world, except a few small ones in remote places, that have no railroads. The automobile, too, along



Above: The flagship of an American airline warming up for one of its routine flights between New York and Chicago. Left: A hook-and-ladder unit of a modern city fire department. The speed of such motorized apparatus in arriving often enables firemen to put out the blaze before it has a strong hold.

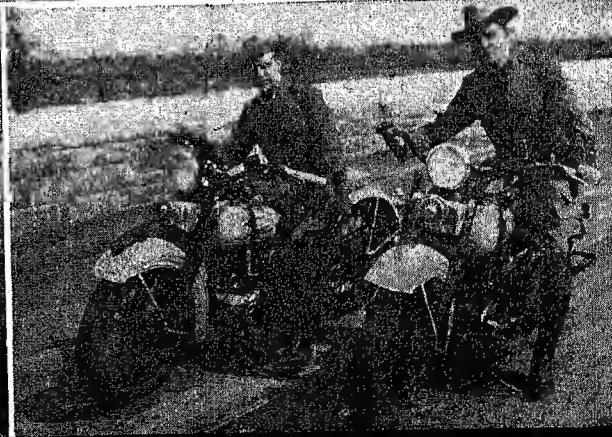
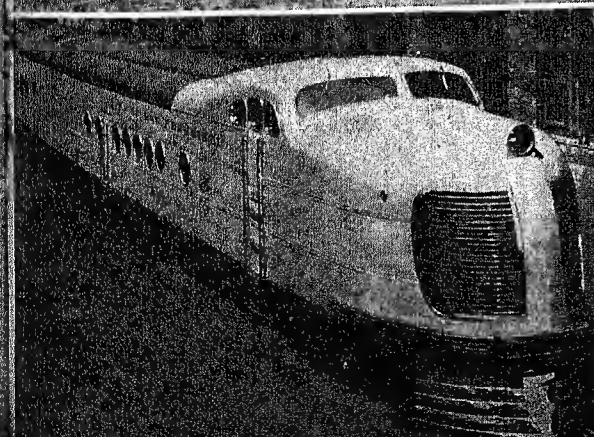
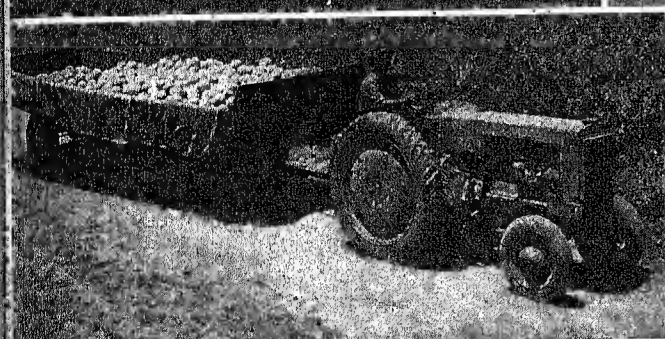
Photos: Mack Star; American LaFrance-Foamite

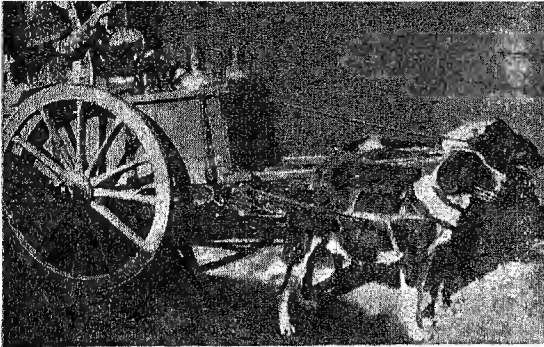


WHEELED VEHICLES WITH ENGINES

Above: Busses, many of them on regular transcontinental schedules, transport passengers and luggage. Left: The tractor has largely displaced the horse on the farm. It is used for a variety of purposes, including plowing, disking, harrowing, harvesting, and hauling. This farmer is using his tractor to haul a load of cantaloupes to market. Lower left: Streamlined trains, powered with Diesel engines burning crude oil, make railroad travel more speedy and comfortable. Below: Fast motorcycles make it possible for policemen to patrol city streets and state highways. During World War II, dispatch riders on motorcycles played an important part in the German advance on Paris.

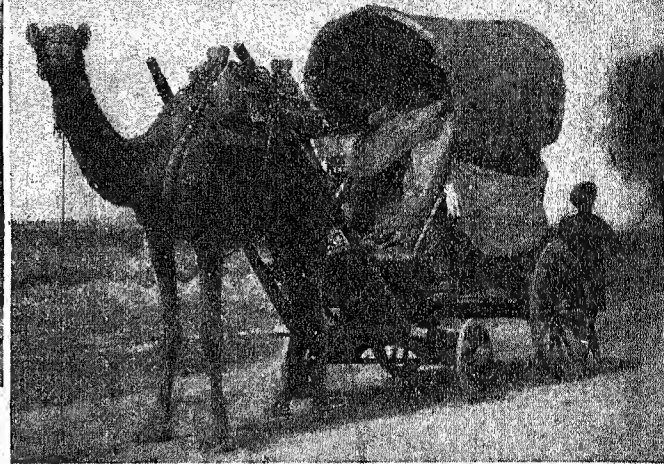
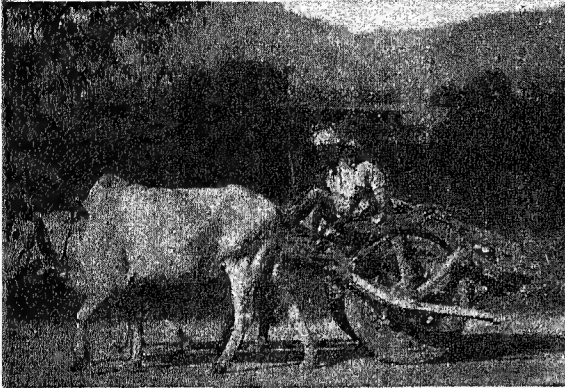
Photos: Brown Brothers; Kaufmann-Fabry; Ewing Galloway





Above: In Belgium and Holland milk is often delivered by dogcart. *Right:* The man-drawn jinrikisha is still a means of transportation in Japan and South Africa. *Below:* In many parts of India crude carts with wooden wheels are still used in the rural districts. Drawn by a pair of bullocks, the carts are slow and clumsy.

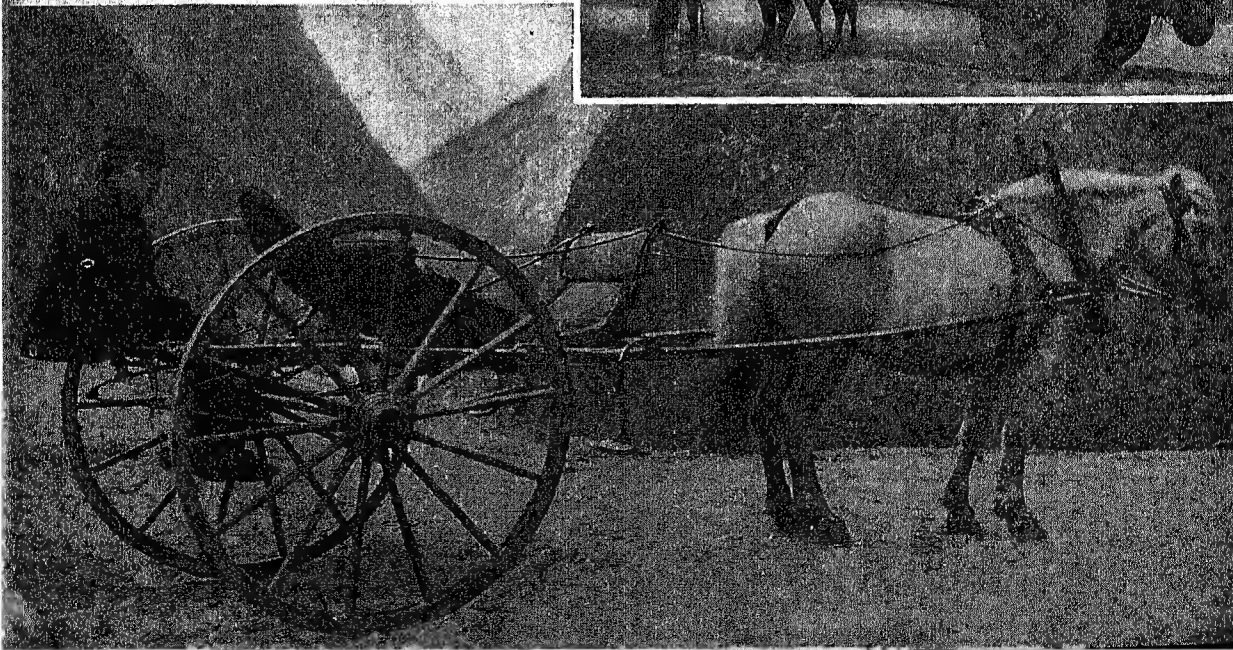
Photos: Brown Bros.; Smithsonian Institution; Visual Education

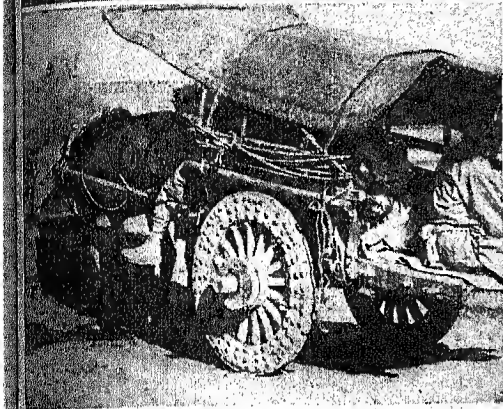


TRAVEL IN OTHER LANDS

Second right: The camel carriage of India, photographed near Delhi, the capital city of India on the Jumna River. Note how the camel is harnessed to the shafts. Travelers riding in this slow-moving conveyance are protected from the hot sun by the semicircular bamboo top. *Third right:* A water cart of Nicaragua; even today, water is carried in this wooden barrel mounted on a crude two-wheeled cart and delivered from house to house. *Below:* A horse-drawn Norwegian kariol which permits its occupants to enjoy the rugged mountain scenery of the country.

Photos: Visual Education; Smithsonian Institution





UNUSUAL CONVEYANCES

Upper left: Java's covered wagon is made of bamboo. The pole extending from the yoke is painted with designs to ward off evil spirits. *Upper right:* In China, wheelbarrows pushed by coolies are used for transportation. *Above:* Such carts, although slow, are common in Peiping and other parts of China. *Right:* The jaunting car of Eire (Ireland). *Below:* A widely used vehicle of Ceylon drawn by water buffalo. *Lower right:* Most Sicilian carts are gaily decorated. Even the carts used for hauling coal are beautifully carved and painted.

Photos: Ewing Galloway; Visual Education: Keystone; Black Star



with the rapid development of bus and truck services, has brought many changes in the more civilized countries of the Old World since 1920. Even in equatorial Africa some of the native chiefs have automobiles. In countries where transportation services are operated by the government, public motor-coach and automobile-trucking services are run in close connection with the railways.

In some countries the airplane provides the chief transportation service. In South America, for example, railroad service between countries, or even between sections of one country, has been difficult, if not impossible. This has been due to the mountain ranges, rivers, and jungles, obstacles the airplane can readily overcome. Much of the interior of Australia long remained undeveloped because of the difficulty of overland transportation. Today, with the establishment of extensive airlines, remote parts of this country are being settled. Probably the most inexpensive and widely used vehicle for individual transportation in other lands is the bicycle.

Nearly all the modern methods of transportation, including the wagon, the locomotive, the ship, the bicycle, and the automobile, originated in countries other than the United States. Yet in no other country have they been so widely used. Though the industrial nations use modern types of transportation, yet the older, slower, and more backward methods are still followed in some countries. Few possess within their borders the essential fuel and petroleum products. The struggle for existence in the crowded Old World has been long and hard, the standards of living are low, and the people cannot afford to take advantage of modern transportation methods. To some extent also, the climate and surface of a country determine the type of transportation that may be used. Some countries have the roads but no money to acquire modern vehicles. Other countries have the money but not the roads. It is not uncommon, therefore, to see in everyday use a variety of transportation methods, both primitive and modern.

Beasts of Burden. The small-eared Asiatic elephant, which has been domesticated for centuries, is still widely used in India, Burma, and Thailand chiefly as a beast of burden for men and merchandise. A poor man, however, cannot afford to own an elephant because of the large amount of food it eats. (See ELEPHANT.) In desert countries the camel (which see) is widely used. Its wide-spreading, padded feet enable it to walk without sinking into the desert sands. It can live off the land, and can go without water for several days. Camel flesh and milk furnish food for the people. Animals which are suited for transportation purposes, and yet whose flesh and milk can be used as food, are preferred as beasts of bur-

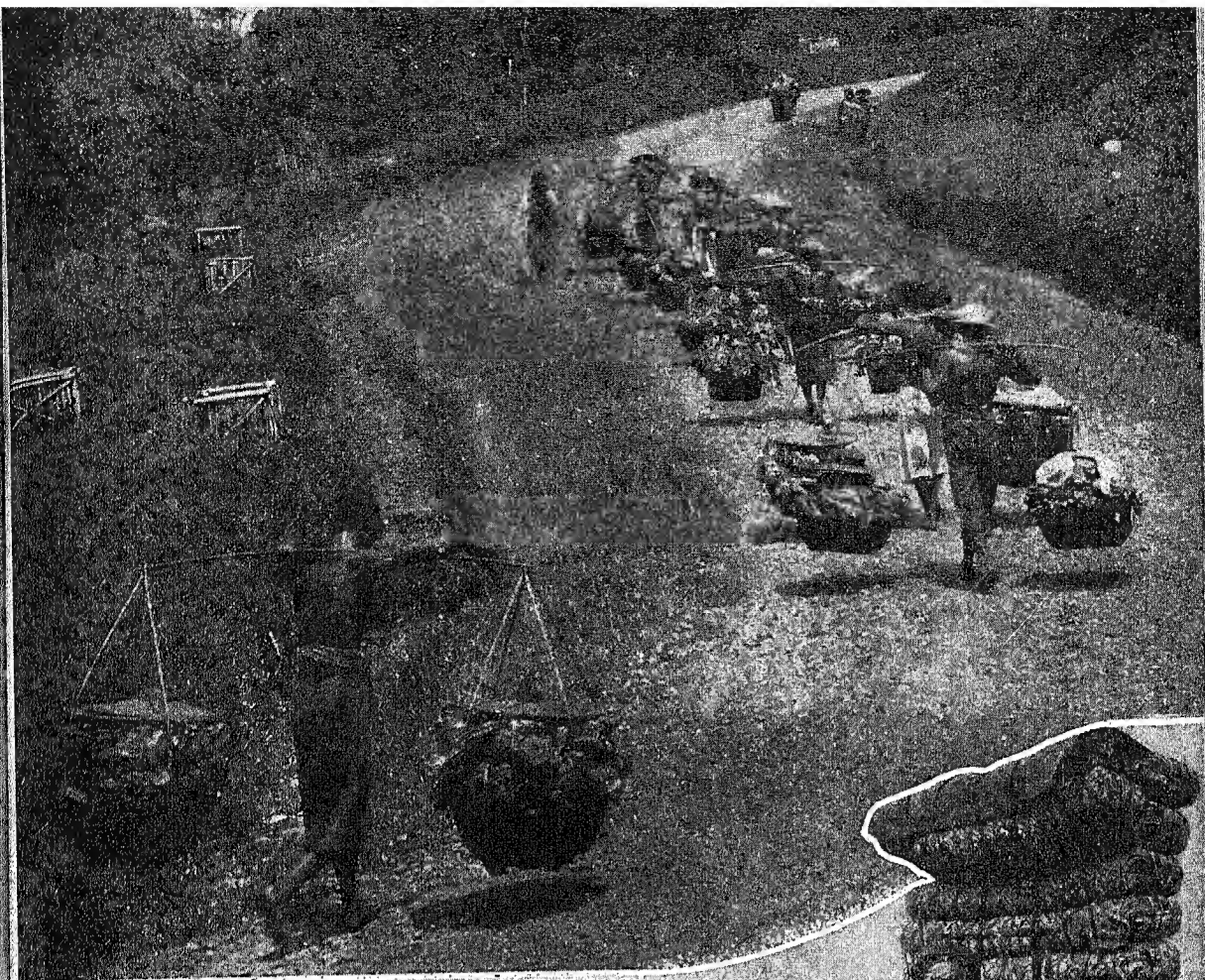
den. In northern, cold climates the dog and the reindeer are widely used in both the Old and the New worlds. One rarely sees a picture of Lapland, for instance, without seeing a reindeer harnessed to an open sled. In Egypt, India, Central Europe, Mexico, and parts of the United States, oxen are used in great numbers as draft animals to pull sleds, carts, and wagons. Other beasts of burden include the llama, popular in Peru; the shaggy yak, found in China and Tibet; and the water buffalo of the Malay Straits and the Philippines.

Unusual Conveyances. In various parts of the world, a number of unusual methods of transportation have come into existence to meet a variety of conditions. Among them are the funicular, or cable, railways in the Alpine sections of Switzerland, Italy, and Germany. Many cogwheel railroads are in use for transporting passengers and merchandise from the bottom to the top of steep mountains where grades are too sharp for ordinary trains. Perhaps the most unique of such special transportation services is that of tractor trains, recently put into operation in Alaska. With these trains, guided by scouting airplanes overhead, the farthest outposts are supplied with the necessities of life and brought into touch with the outside world.

In many lands, man still furnishes the power for transportation, as in the case of the jinrikisha of Japan and South Africa. In others, man himself is the beast of burden, as in transporting the litter of the Belgian Congo or the palanquin of India. In each of these conveyances the passenger sits or reclines in a small boxlike enclosure. This is suspended from the center of a long pole or poles, carried on the shoulders of two or more men. In cold climates, with long seasons of snow and ice, such as in Russia, the sleigh is widely used. In towns and countries with steep hills, such as Madeira, sleds are the only safe means of conveying people or goods down the stone-paved streets.

Primitive water conveyances are also in use today. Travelers to Greenland or Alaska may see Eskimos piloting outboard motorboats, but they will see many more using the homemade sealskin-covered kayak, umiak (open boat made of a wooden frame covered with skin), or bidarka (portable boat of stretched skins). In China junks (ships with high sterns) and sampans (small boats) with sails of matting and figures painted on the bows carry much of the freight on the rivers and along the coasts. Beneath the poop deck of these boats, niches are provided for the image of Buddha, the god of the Chinese. Thousands of Orientals spend their lives aboard primitive houseboats.

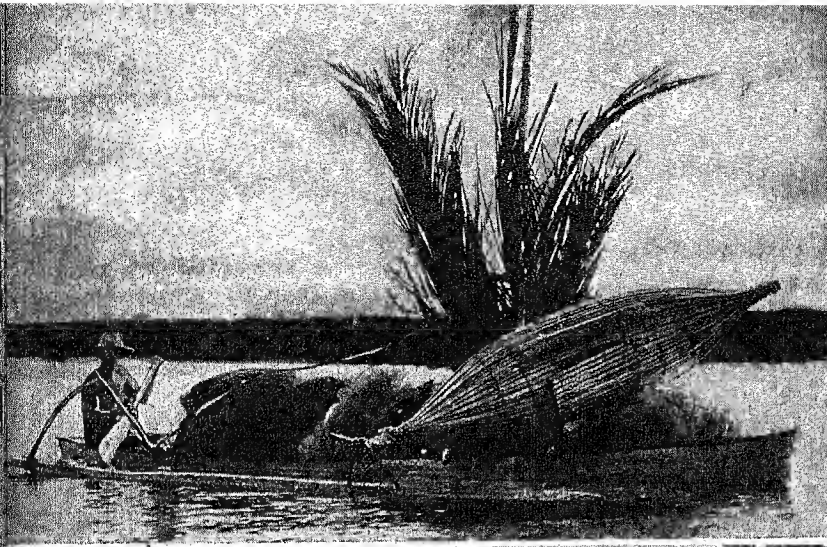
In some countries, particularly in France, Germany, Holland, and Belgium, canals have been brought to a high state of development. Although slow, the canal provides a most eco-



MAN AS BEAST OF BURDEN

In lands where labor is cheap, transportation has been slow to develop and man remains his own beast of burden. *Upper:* With yokes across their shoulders, these Chinese gardeners on the island of Java are carrying vegetables to market. *Lower left:* In Mexico, such sights as this man with his load of homemade baskets are common. *Above:* This twelve-year-old Chinese boy, carrying eighty pounds of tea, is making a four-hundred-mile trip with his father whose load weighs 350 pounds.

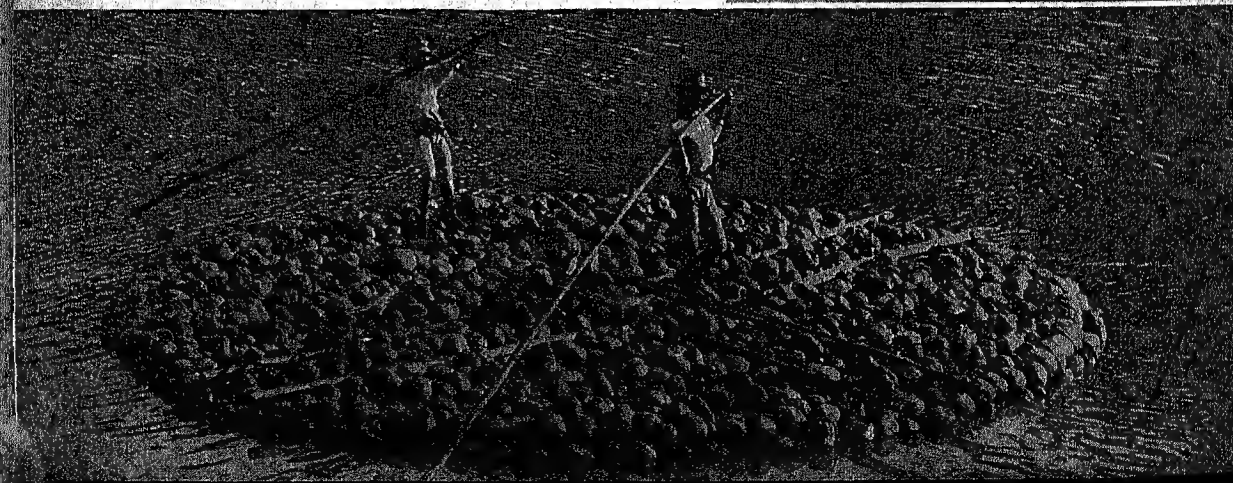
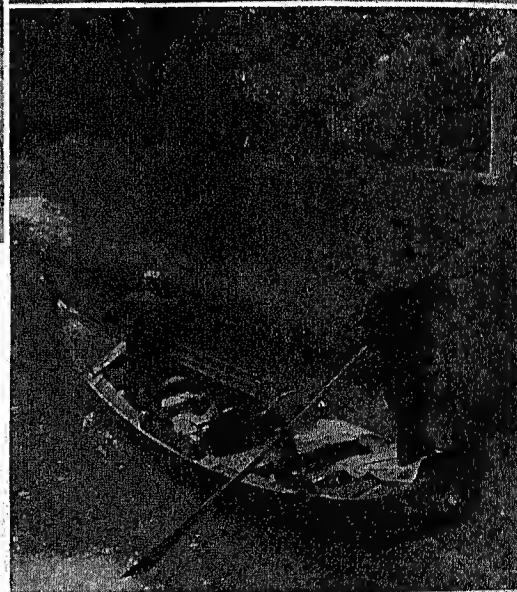
Photos: Ewing Galloway; Tager-Pix; U & U



WATER CONVEYANCES OF OTHER LANDS

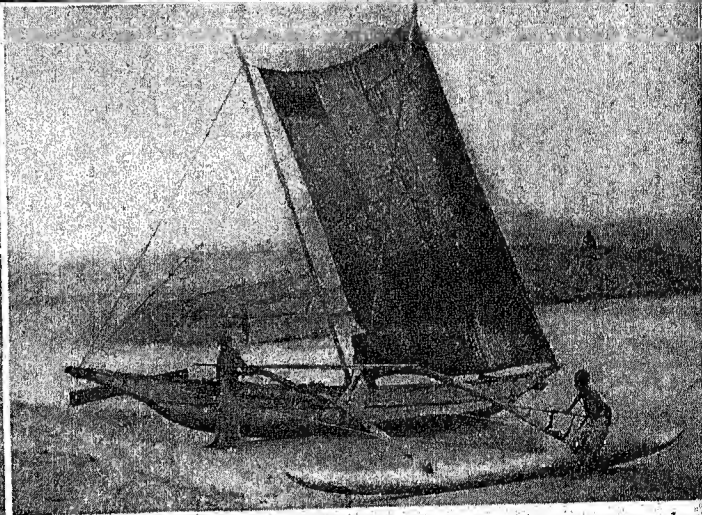
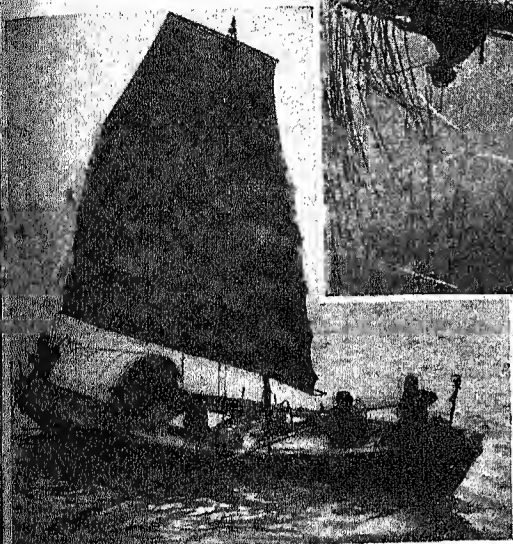
Top: Fishermen on the island of Bora Bora in the South Seas use palm leaves as sails for their boats. The huge wicker basket in the bow of the boat is used as a fish trap. *Upper right:* A Mexican flower girl in a dugout boat on Lake Xochimilco near Mexico City. *Above:* A houseboat and watercab on the Yangtze River in China. In transporting passengers and goods, every member of the family lends a hand with the rowing. *Right:* One of the famous gondolas of Venice, Italy. *Below:* In the Philippines, coconuts are made into rafts and floated downstream to the nearest city to be sold in the market.

Photos: Acme; Pix; Ferstli; Keystone



Right: Boats made from balsa wood used on Lake Titicaca between Bolivia and Peru in South America. *Below:* A sampan or skiff used on the coasts of China and Japan. *Upper right:* Chinese junks still haul tea, spices, and other cargoes over Oriental seas as they have for centuries.

Photos: Black Star; Keystone



Above: In the Polynesian Islands, the natives use outrigger canoes and homemade sails. *Left:* The kufa, a round boat made of basketry and skins, used on the Tigris River in Iraq. *Below:* An Eskimo kayak, made of sealskin, is about sixteen feet long and sixteen inches wide.

Photos: Brown Bros.; Ewing Galloway; Paul



nomical means of transportation. In these countries it is considered so important that all canals are maintained with the most modern equipment.

Problems and Progress

Today, there are about 250,000 miles of railways in the United States, or nearly one third of all the railroad mileage of the world. There are more than 3,000,000 miles of highways, about 28,000 miles of navigable rivers and canals (without counting the Great Lakes or the Panama Canal), and about 40,000 miles of airways.

Government Regulation. The Federal Government, as well as the states, having the interest of the people foremost in mind, has kept pace with the rapid progress in the transportation industry. Throughout the nineteenth century the railroads were the only major transportation agency in the nation. They had things much their own way, although from 1870 to 1887 they experienced turbulent years. Railroads were bought, sold, and combined by speculators. Freight rates were juggled to kill competition, and large shippers were favored at the expense of small ones by secret freight rebates. Inland sections suffered disadvantages because of the additional cost of long hauls. These practices led to keen competition between rival railroads, and widespread public protests arose for government control. In 1887, Congress established the Interstate Commerce Commission. (See INTERSTATE COMMERCE ACT.) It was given power to investigate complaints, correct abuses, fix traffic rates, and supervise the incorporation or purchase of one railroad by another.

Since that time, Government regulation of the railroads has been further increased by the passage of additional laws and amendments. Through these regulations have come the safety controls which have made rail travel in the United States as safe as it is. These controls include airbrakes on all railroad cars; the installation and regular inspection of automatic electric signaling devices and automatic train-stopping mechanisms; the inspection of steam-locomotive boilers; and the requirement of numerous other safety appliances, such as handbrakes, ladders, running boards, and sill steps. Strict traffic regulations, both on highways and airways, are in force. The examination and licensing of airplane pilots and, in many states, of operators of motor vehicles, is required by law. Regular inspection of commercial aircraft and of automobiles is required in most states. Standard specifications for constructing airfields and highways are available. Official information concerning weather conditions is broadcast daily from the United States Weather Bureau. All these things are done in the interest of comfort, speed, and safety.

Competition. By 1925, the automobile, truck, and bus had made real inroads into the transportation field. The airplane, too, was past the experimental stage, and began to bid for transportation business. Truck and bus lines not only paralleled the railways from one state to another, but also offered transportation services that the railroads could not always give. Existing inland waterways and additional navigable streams were hauling bulk freight. Competition became keen. The railroads, strictly controlled by Federal statutes, were particularly hard hit, for they were in competition with unregulated agencies.

More and more as time goes on, there is co-ordination of railway, airline, highway, inland waterway, and transoceanic services. This involves the establishment of the most logical and practical mode of transportation for the type of service required. There is almost complete co-ordination between the major airlines and railway lines, and between bus and truck services.

Science and Invention. Science has been active not only in the development of new products useful to the transportation industry, but also in the improvement in quality of the materials of construction. Through the use of alloys, plastics, lacquers, rubber, improved lubricants, and antiknock gasolines and fuel oils, weight has been reduced, speed with safety has been increased, and comforts hardly dreamed of a decade ago are common. Freight trains attain speeds of more than sixty miles an hour and are today running on yesterday's passenger-train schedules. Air conditioning, insulation from noise, connecting vestibules, diffused lighting, and reclining seats, make travel easier for the railroad passenger. Likewise, the automobile is more efficient, more comfortable to ride in, and safer to operate than it was a few years ago. The luxurious air liner, too, is the product of modern science and technology.

C.W.M.

Related Subjects. In addition to information under the subhead *Transportation* in articles on the various states and provinces, the reader is referred to:

Agriculture	Motorboat
Aircraft	Motorcycle
Automobile	Ocean (Ocean Routes)
Bicycle	Palanquin
Boat	Pavement
Canal	Pioneer Life
Cape-to-Cairo Route	Pneumatic Tubes
Caravan	Pontoon
Compass	Railroad
Common Carrier	Roads and Streets
Cumberland Road	Safety
Diesel Engine	Sailboat and Sailing
Dixie Highway	Ship
Electric Railway	Steam Engine
Ferry	Submarine
Gondola	Subway
Industrial Revolution	Taxicab
Jinrikisha	Traction Engine
Lincoln Highway	Trails of Early Days
Locomotive	Trans-Siberian Railway
Monorail, Suspended	Wheel and Axle



CONVEYANCES WITHOUT WHEELS

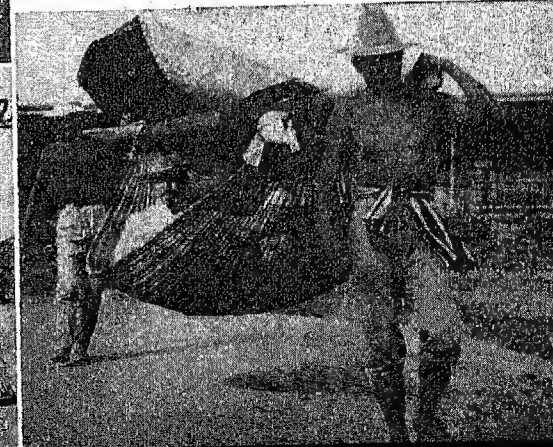
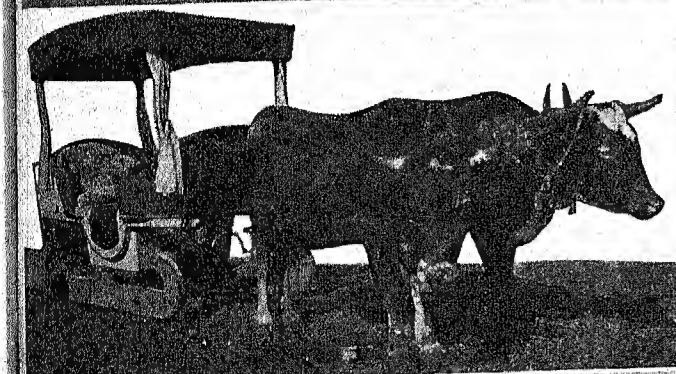
Upper left: Iceboats on a New York lake; equipped with sails, such boats can travel at a high rate of speed. *Upper right:* A Chinese sedan chair carried by coolies. *Above:* When winter sweeps over Alaska, sleds drawn by huskies are the chief means of transportation. *Left:* An Indian travois of early days. *Below:* In Lapland, homemade sleds drawn by swift reindeer are used when snow covers the ground.

Photos: F.P.G.; Keystone; Paul; Smithsonian Institution



Left: On the island of Madeira, off the northwest coast of Africa, sledges are drawn by oxen over the cobblestone streets. *Lower left:* The troika seen in parts of Russia. *Below:* A litter used in the Philippines.

Photos: Acme; Smithsonian Institution; Ewing Galloway



Books for Adults

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- DUNBAR, SEYMOUR. *History of Travel in America*. Tudor, 1937. Modes of travel from colonial times to completion of first transcontinental railroad.
- FORAN, WILLIAM R. *Transport in Many Lands*. Warne, 1939. Personal experiences with animal transport in many remote quarters of the world over a period of forty years.
- JOHNSON, EMORY R. (and others). *Transportation: Economic Principles and Practices*. Appleton-Century, 1940. Railroad, pipe line, air, water, and highway transportation.
- LOCKLIN, DAVID P. *Economics of Transportation*. Business Publications, 1938. Transportation industry and economic life of present-day society.
- MANCE, SIR HARRY O. *Road and Rail Transport Problem*. Pitman, 1940. Recent transport history and description of attempts made to co-ordinate transport systems.
- RECK, FRANKLIN M. *Romance of American Transportation*. Crowell, 1938. History of transportation in America illustrated with old prints.
- ST. CLAIR, LABERT. *Transportation Since Time Began; Land, Air, Water*. Dodd, 1933. History of transportation from beginning of time.

Books for Younger Readers

- DALGLIESH, ALICE. *America Travels*. Macmillan, 1933. Hundred years of travel in America.
- FOX, FLORENCE C. *How the World Rides*. Scribner, 1929. Transportation progress through the centuries.
- GILCHRIST, MARIE E., and OGLE, LUCILLE. *Rolling Along Through the Centuries*. Longmans, 1937. Development of the wheel in transportation from time of ancient Babylon to present.
- HADER, BERTA, and HADER, ELMER. *Picture Book of Travel*. Macmillan, 1928. Brightly colored pictures with brief text.
- MULLER, CHARLES G. *How They Carried the Goods*. Dodd, Mead, 1932. From creaking sleds of Pharaoh to swift airplanes of today.
- PETERSHAM, MAUD, and PETERSHAM, Miska. *Story Book of Wheels, Ships, Trains, and Aircraft*. Winston, 1935. Transportation from earliest times to present (well illustrated).
- VAN METRE, THURMAN W. *Tramps and Liners*. Doubleday, 1931. Water transportation from first hollow log of ancient man to recently built liners.
- WALDEN, ARTHUR T. *Harness and Pack*. American Book, 1935. Pony Express, pack train, stage-coach, covered wagon, horse boat, and horse car.
- WEBSTER, HANSON H. *Travel by Air, Land, and Sea*. Houghton, 1934. History of transportation, including bridges, tunnels, and highways.

Outline

I. Transportation and Its Influence

- (1) Beginnings of transportation
- (2) Its influence
 - (a) On everyday life
 - (b) In promoting world unity
 - (c) On standards of living
 - (d) On trade and commerce
 - (e) On farm and city life
 - (f) On communication
 - (g) In the spread of culture
 - (h) In war
 - (i) In making first aid effective
 - (j) In creating new occupations and vocations

II. Epoch-making Developments

- (1) The wheel
- (2) Ships and sails
- (3) The compass
- (4) Steam engine
- (5) The screw propeller
- (6) Electric motor
- (7) Internal combustion engine
- (8) Engineering developments

III. In the United States

- (1) In colonial days
 - (a) Travel by water
- (2) First Federal highway
- (3) Conestoga wagon
- (4) Packet ships and china clippers
- (5) The railroad
- (6) The automobile
- (7) The airplane
- (8) The Diesel engine
- (9) Pipes and lines
- (10) Achievement of speed and comfort
 - (a) Superhighways

IV. In Other Lands

V. Problems and Progress

- (1) Government regulation
- (2) Competition
- (3) Science and invention

Questions

What influence has modern transportation had on (a) the clothes we wear; (b) the food we eat; (c) the homes we build?

How has the development of transportation made the world seem smaller?

What connection does transportation have with (a) farm life; (b) city life; (c) industry?

In what way does communication depend on transportation?

Who invented the screw propeller? How did this speed up ocean travel?

What effect did the invention of the steam engine have on land and water travel?

In what way did the electric motor affect the life of city dwellers?

What invention led to the development of the automobile? How did this invention influence developments in other fields of transportation?

If all means of transportation were suddenly removed, what effect would it have on the life of the people?

What were the outstanding events in the development of transportation in the United States from colonial times to the present day?

What evils as well as benefits have come with the development of transportation?

How has transportation given rise to new occupations?

In what way do pipelines and overhead and underground cables and wires play a part in modern transportation?

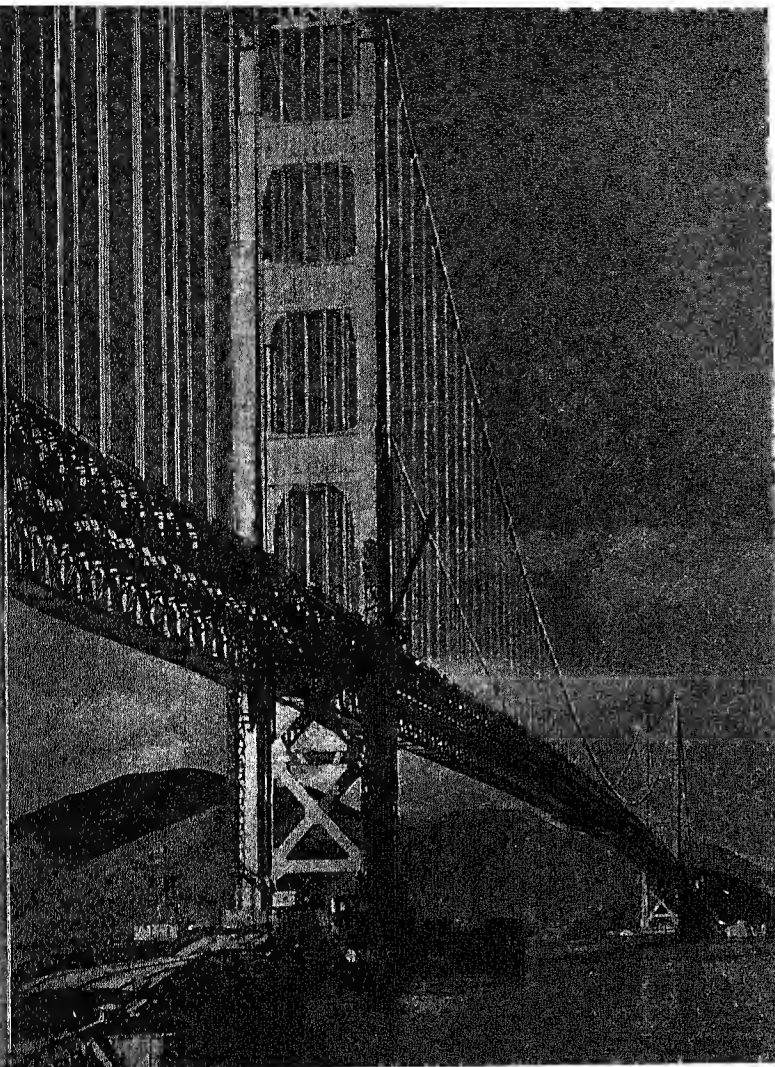
During the gold rush of 1849, what was the favorite means of travel by land and by water?

Why did the American clipper ship become so famous?

How do means of travel in backward countries differ from those where civilization is more advanced?

Why is it necessary to have government regulation of transportation?

How does transportation depend on science and invention?



AIDS TO TRANSPORTATION

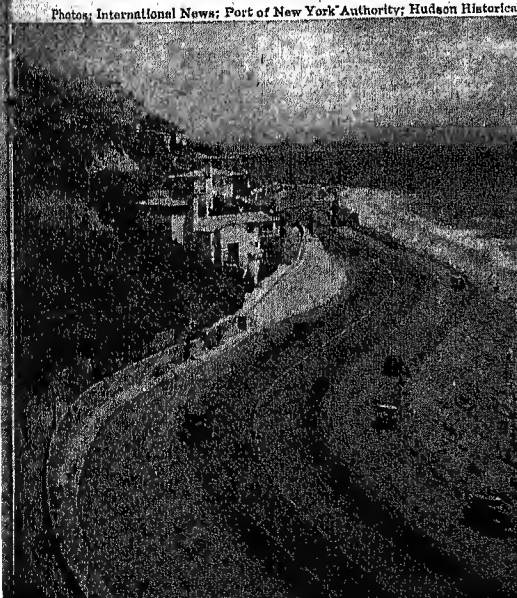
As the need for transportation has increased and new modes of travel have developed, man has built bridges, tunnels, highways, and canals. Today, great engineering feats surmounting natural obstacles are found in most civilized countries of the world.



Upper left: The Golden Gate Bridge at San Francisco, the world's longest suspension span, was opened to traffic in 1937. *Upper right:* Interior of the Lincoln Tunnel under the Hudson River, connecting New York City with New Jersey. *Lower left:* This wide, paved highway skirting the Pacific Ocean helps California travelers to reach their destination quickly

and safely in all weathers. *Lower right:* The new Welland Ship Canal, Canada, completed in 1932, is a part of the Saint Lawrence Waterway, linking Lake Ontario with Lake Erie. Without this canal, Niagara Falls and rapids would effectively prevent sea traffic from reaching Buffalo, Cleveland, Chicago, Milwaukee, and other large cities along the Great Lakes.

Photos: International News; Port of New York Authority; Hudson Historical Bureau; American Airlines





ROUTE OF THE TRANS-SIBERIAN RAILWAY

The line with the crosshatching is the actual Trans-Siberian Railway. Connections with Leningrad and Port Arthur are indicated on this map, as of especial importance.

TRANSPORTATION ACT, the common name for the Esch-Cummins Act, which is the principal Federal law dealing with the regulation of railroads in the United States. It especially increased the power of the Interstate Commerce Commission (which see), with detailed provision for regulating railroad problems. See **RAILROAD** (Esch-Cummins Act).

TRANS-SIBERIAN, *si be' rih an*, **RAILWAY**, the longest single railroad in the world, between Moscow and Vladivostok, and connecting (near Kirov) with Leningrad. Bisecting the plains of Siberia, it crosses 111 degrees of longitude and extends over one sixth of the distance around the globe. Its exact mileage is a matter of debate, since the Soviets have built numerous branches that may or may not be considered as part of the Trans-Siberian. In fact, the Soviet government has officially discontinued the use of the name Trans-Siberian, various parts of the system being known under special names of their own. The old name is reserved for the Trans-Siberian Express which covers the distance between Moscow and Vladivostok in nine and one-half days, going via Kirov, Perm, Sverdlovsk, Omsk, Krasnoyarsk, Irkutsk, Chita, then north of the Amur River through Khabarovsk to Vladivostok, a total distance of about 5,800 miles. Near Kirov, special cars from Leningrad are joined to the express.

The building of the railroad marked the dawn of a new era in the development of Siberia. Local industries and foreign trade were stimulated in the rich coal fields of the eastern section, and in the great livestock and agricultural regions of the central and western plains. Just before World War I, the railway was carrying several hundred thousand pioneers into Siberia each year.

The construction of a transcontinental rail-

way joining the cities of European Russia and the Asiatic ports was first planned in 1850, but, owing to the vastness of the project and its great expense, the government delayed its construction. In 1891 Serguey Witte (which see), the Russian Minister of Finance, succeeded in obtaining the imperial approval of the road, and work was immediately begun. The construction progressed with unparalleled rapidity; the strictly Siberian section was completed by 1898, the rate of construction averaging two miles each working day. The cost of the entire road was more than \$500,000,000. There was much cheating by the officials and contractors in spending this money.

From Sverdlovsk the line extends across the western and central plains in a southeasterly direction, from Omsk in a general easterly direction to Krasnoyarsk, where once more it bends to the southeast. Beyond Irkutsk it winds east and south around the southern end of Lake Baikal; bending northeast, it then pierces the lofty mountains, and continues east to the Pacific slopes. From Khabarovsk it extends south to Vladivostok.

The original plan was to build the section between Sretensk and Khabarovsk to the north of the Amur, but an agreement with China made possible a short cut farther to the south, through Harbin. This Manchurian section has a branch extending south to Port Arthur. As the result of the Russo-Japanese War of 1904-1905 this southern branch was ceded to Japan. In 1935 the main short cut running through Harbin, known as the Chinese Eastern Railroad, was sold by the Soviet government to the Japanese government. The original plan of building a line north of the Amur was revived by the czar's government after 1905; the line was completed a decade later. After 1935 the Trans-Siberian Express took this route.

To the czar's engineers the building of the division around Lake Baikal and across the eastern mountains, known as the Trans-Baikal section, presented vast difficulties, because of the steep slopes and apparently bottomless marshes. The line was opened to traffic before this section was completed, and for three years cars were transferred across the lake by ferry, or in winter on rails laid on the ice. Most of the line was originally single track, and though the roadbed was fairly substantial, light rails and inexpensive ties were used, mainly because of the builders' dishonesty. Later it was much improved by enlarged sidings, extended sections of double track, and reduced grades. The bridge which spans the Irtysh River at Tobolsk is almost four miles in length, and is considered one of the best railway bridges in the world.

During the Russo-Japanese War, the Trans-Siberian Railway was one of Russia's most valuable assets; it transported 1,000 troops a day to the front, as well as enormous quantities of arms and munitions. In both world wars, it was again of invaluable military service, although enormous demands made upon it seriously impaired its equipment. Although supplies were carried from the East to Russia by way of Archangel and the White Sea, the railroad furnished a quicker and safer route, and transported quantities of munitions from the Pacific ports to Russia in Europe. The railway was the chief factor in consolidating Russia's Asiatic possessions, and in extending its influence over that great domain.

The menace to the port of Vladivostok by Japanese troops in Manchuria after 1932 prompted the Soviets to improve and extend the line formerly known as the Trans-Siberian. In 1937 the double-tracking of the main route was completed, and a number of important branch lines were built.

A.P.
See BAIKAL; SIBERIA.

TRANSUBSTANTIATION, *tran sub stan'-shih a' shum*, a theological doctrine defined in a canon of the Council of Trent (which see), and which represents the belief of the Roman Catholic Church on the subject. It is expressed as follows:

If anyone shall say that, in the most holy sacrament of the Eucharist, there remain the substances of bread and wine together with the body and blood of our Lord Jesus Christ; and shall deny that wonderful and singular conversion of the whole substance of the bread into His body and of the wine into His blood, the species only of bread and wine remaining—which conversion the Catholic Church most fittingly calls *Transubstantiation*—let him be anathema.

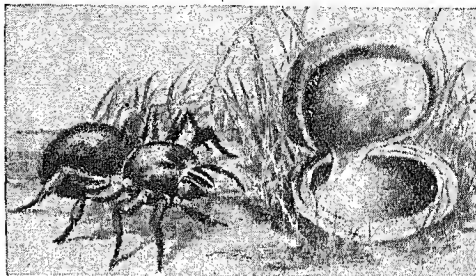
According to an eminent authority, in the definition above, the word *substance* means *basic* or *primary reality*, and the word *species* is used for *outward appearance*. R.J.P.

TRANSVAAL, *trans vahl'*, **THE**, one of the four original provinces in the Union of South

Africa (which see). The early Boer settlers gave it this name, because it is located beyond (or north) of the Vaal River. See also **SOUTH AFRICAN WAR**.

TRANSYLVANIA. See **RUMANIA** (Historic Provinces).

TRAPDOOR SPIDER, an interesting spider found in warm regions, which constructs a hinged door of silk and earth to cover the round entrance to its underground nest. This door, made of alternate layers of silk and mud, fits the entrance perfectly, and is hinged at one side to the silk lining of the burrow. In loosening and carrying away earth, and in



TRAPDOOR SPIDER AND ITS NEST

spinning silk to make the door and lining, the spider works long and laboriously. Tunnels almost an inch across and a foot long are dug by a species found in the southwestern part of the United States. When in danger, the spider flees into the tunnel and clings to the door with its jaws. The burrow is also a place of refuge for the mother spider when rearing her young. As a measure of precaution, the entrance is concealed by a covering of earth or gravel. These spiders are large, hairy creatures, belonging to the tarantula family. They feed principally on ants and other wingless insects, and sometimes on caterpillars and earthworms. S.H.S.

Scientific Name. Trapdoor spiders belong to the family *Theraphosidae*, of the class *Arachnida*. The species common in the Southwestern United States is *Ctenizsa californica*.

TRAPEZIUM, *tra pee' ih um*, as usually defined, a plane figure having four sides, none of which are parallel. See **QUADRILATERAL** (Trapezoid and Trapezium); **MENSURATION**.

TRAPEZOID. See **QUADRILATERAL** (Trapezoid and Trapezium); **MENSURATION**.

TRAPPISTS, *trap' istz*, a branch of the Reformed Cistercian monks, famed for the austerity of its rules. These were introduced in 1664 by the abbot of La Trappe, a Cistercian monastery founded in Normandy, in 1140. The order was driven out of France during the Revolution, but returned about 1817. At the time of the expulsions of 1903, in France, there were fifty-eight Trappist monasteries in that

country. At the present time, the Trappist monasteries are scattered throughout Europe, Asia, Africa, the United States, Canada, and China.

A Trappist gives most of his time to prayer and meditation; the rule of fasting is severe, with meat, eggs, fish, wine, and beer absolutely forbidden. An unalterable rule of strict silence is observed among the monks, and only the abbot and the guest-master are allowed to speak to strangers. The bed consists of a board and a pillow of straw, and the garments are not removed at night. Several hours daily are devoted to hard labor. In heathen countries, the work of the order is directed to the civilization and education of the natives. R.J.P.

TRAPS AND TRAPPING. See **FUR AND FUR TRADE** (Fur Conservation).

TRAUMATIC IRITIS, *traw mat' ik i ri' tis*. See **BLINDNESS** (Common Eye Diseases).

TRAVELER, Lee's horse. See **LEE**, ROBERT E.

TRAVELERS' CHECK. See **CREDIT**, LETTER OF.

TRAVERSE, LAKE. See **SOUTH DAKOTA** (Rivers and Lakes).

TRAVERSE CITY, MICH. See **MICHIGAN** (back of map).

TRAVERTINE, *trav' ur tin*, is a white or straw-colored porous stone, formed from the lime deposits of streams, lakes, and springs. It is a soft and spongy rock, easily worked when first quarried, but hardening afterward. Large deposits are found in many parts of Italy. It is the material that was used for the outside walls of numerous buildings of ancient and modern Rome, including Saint Peter's and the Colosseum. Among the ancient Romans, it was known as the stone of Tibur (*lapis tiburtinus*), because it was formed by the waters of the Anio at Tibur, an ancient Latin town, now Tivoli. It cannot be used as a building material in countries where the temperature falls below the freezing point, for the rock is so porous that it absorbs much water, which would expand on freezing and cause the rock to disintegrate. A.J.

TRAVIATA, LA, *trah ve ah' tah, lah*. See **OPERA** (Some of the Famous Operas).

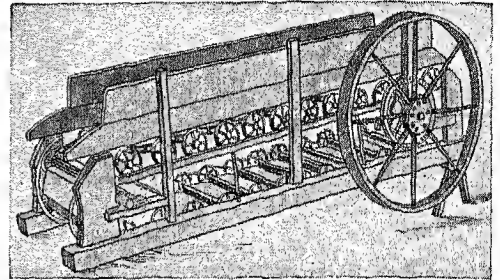
TRAVIS, WILLIAM BARRETT. See **ALAMO**.

TRAWL. See **NET**.

TREACLE, *tre' k'l*, **BIBLE.** See **BIBLE** (Some famous Bibles).

TREADMILL, *tred' mil*, a machine formerly used in prisons, in some countries, where it was operated by convicts sentenced to hard labor. It consisted of a large, wide, and heavy revolving wheel with steps around the circumference and a handrail above. When the criminals were placed on the steps, the weight of the men started the wheel to revolving. To keep their balance, they were forced to grasp the rail and tread the mill so long as the

machine was in motion. The power produced could be used for grinding corn or for other similar purposes. Operation of the machine was considered a form of cruelty, and its use as a punishment has been abandoned. When



OLD FORM OF TREADMILL

introduced in England, in 1818, it was intended as a means of employing criminals usefully.

The name is still applied to a machine in which use is made of the weight of dogs or horses on a series of treads, for industrial purposes.

As a Figure of Speech. The word is used in literature, in a figurative sense, to signify ceaseless toil.

TREASON, *tre' z'n*, in a broad sense, is treachery, breach of faith, or the betrayal of any trust. In its legal application, it is a serious breach of allegiance to a government, committed by a citizen or subject, or by one under its protection; as such, it is the greatest crime known to the law, as attacking the safety of a sovereign state or its head. While murder is a grave offense, its results directly affect but few people; treason, if its object be accomplished, may destroy the peace of a nation and work harm to all of its citizens. Possibly as comprehensive a definition of treason as can be given is found in the United States Constitution, Art. III, Sec. 3, and it is the only crime defined in that document. With the change of a few words, it will apply to any country:

Treason against the United States shall consist only in levying war against them, or in adhering to their enemies, giving them aid and comfort.

The present law of treason, both in England and in the United States, is based upon the Treason Act of England, passed in 1351, during the reign of Edward III. This act follows the principle of the old Roman law of 48 B.C. Before the Norman Conquest, the laws of Alfred and of Ethelred punished with death anyone plotting against the life of the king.

The possibility of committing treason is not limited to citizens or subjects of a country. An alien within its boundaries owes temporary allegiance to the government which shelters him, and he is bound to observe all the laws which control its citizens; the alien who gives

aid or comfort to the country's enemies is guilty of treason, and against such a charge his own country cannot protect him. To incur punishment for treason, there must be conviction of the crime through federal courts; or, in time of war, when the writ of habeas corpus is suspended, through trial by courtmartial, according to common-law procedure.

In cases of treason against the United States, Congress has power to decide what the punishment shall be, the only provision of the Constitution being that it "shall not work corruption of blood, or forfeiture, except during the life of the person attainted." (*Corruption of blood*, under the common law, deprives one convicted of treason of his estate, and his heirs of their inheritance.) Death or life imprisonment is the usual penalty of the law.

The most notable charges of treason against the government of the United States are those of Benedict Arnold and Aaron Burr; the latter was declared not guilty. The Dreyfus Case in France is the best-known instance of a charge of treason in recent times, but Captain Dreyfus later proved his innocence, and received promotion.

Related Subjects. The following articles in these volumes will serve to make clear the references in the foregoing discussion of treason:

Alien	Burr, Aaron	Crime
Arnold, Benedict	Court-Martial	Dreyfus, Alfred

TREASURER OF THE UNITED STATES.

See TREASURY DEPARTMENT.

TREASURE STATE, a popular name applied to Montana (which see).

TREASURY, DEPARTMENT OF THE, the executive department of the United States Government created to superintend and manage the national finances. The Treasury Department prepares plans for the improvement and management of the revenue and support of the public credit. It collects all taxes levied by Congress, including customs duties, and handles the coinage and printing of money. It acts as the central purchasing agent for Federal supplies. The Coast Guard, which it manages in peacetime but which is operated as a part of the Navy in time of war, is responsible for maritime-law enforcement, protection of life and property, and safeguarding of navigation on the high seas and navigable waters of the United States.

The head of the department is the Secretary, a Cabinet member appointed by the President, with the approval of the Senate, at a salary of \$15,000 a year. He is assisted by the Under Secretary, the Fiscal Assistant Secretary, two Assistant Secretaries, the General Counsel, and a staff of administrative, special, and technical assistants. The management is divided among bureaus, divisions, and offices, including those listed below.

The Fiscal Service performs and supervises

all functions pertaining to the administration of financial operations through the Bureau of Accounts, the Bureau of the Public Debt, and the Office of the Treasurer of the United States. The Bureau of Accounts maintains the accounts relating to revenues, appropriations, and expenditures of all Government organizations. The Bureau of the Public Debt conducts transactions in public-debt issues of the United States, and in interest-bearing obligations of the insular governments and of the government-owned corporations for which the Treasury acts as agent. The Office of the Treasurer of the United States receives and disburses public funds; it is fiscal agent for the issuance and redemption of paper currency, and for the payment of principal and interest on the public debt.

Internal revenue taxes (including income and profits taxes) are determined, assessed, and collected by the Bureau of Internal Revenue. This bureau also enforces the alcoholic beverages and other internal revenue laws. The Bureau of Customs is charged with the collection of import duties and the prevention of smuggling, and is responsible for other enforcement activities relating to the entrance and clearance of vessels and aircraft, and the movement of goods and materials out of the country.

The coinage of money is directed by the Bureau of the Mint, which supervises the United States mints, assay offices, and bullion depositories. The Bureau of Engraving and Printing designs, engraves, and prints paper money and government securities; postage, revenue, customs, and War Savings stamps; and other types of engraved work. The Bureau of the Comptroller of the Currency supervises all national banks, including their consolidation, the organization of new banks, and administration of any which fail.

The Division of Monetary Research provides analyses relating to the Stabilization Fund, Foreign Funds Control, customs, and other Treasury activities concerned with international trade and monetary matters. The Division of Research and Statistics reports on fiscal operations and policies, the estimated volume and source of future revenues, and various actuarial problems in connection with pension and trust funds. The Division of Tax Research provides analyses of tax systems and tax structures, and proposed revenue legislation.

Federal narcotic laws are administered, and narcotic import and export permits are issued, by the Bureau of Narcotics. The Procurement Division negotiates contracts for or makes purchases of supplies and services for general Government requirements: among its duties during World War II was the purchase of goods for delivery to nations subject to the benefits of the Lend-Lease Act. The Secret Service Division protects the President of the United



Photo: U & U

PRICELESS TREATIES CAREFULLY GUARDED

In steel vaults, fireproof and dustproof, in the Department of State at Washington, are stored the treaties that record the agreements mutually entered into between the United States and foreign governments. In the illustration, the custodian is examining the treaty that conceded the independence of the American nation; it was signed on behalf of England by King George III.

States, his family, and the President-elect; it also engages in the suppression of counterfeiting, and performs certain investigational services.

Related Subjects. The reader is referred to:

Assaying (Assay Office)	Money
Banks and Banking	Presidential Succession
Budget	Act
Coast Guard	Secret Service
Counterfeiting	Smuggling
Customs Duties	Tax and Taxes
Hamilton, Alexander	United States in
Internal Revenue	World War II
Mint	Van Buren, Martin

TREASURY NOTES. See **MONEY** (Monetary System of the United States).

TREASURY STOCK. See **BOOKKEEPING** (Opening Corporation Books).

TREATY, a formal agreement, usually but not necessarily in writing, between two or more governments or rulers of independent states, corresponding, in a general way, to contracts between private parties. Only sovereign states can make treaties, and the negotiation of a treaty is a mutual recognition of independence and sovereignty. A *concordat*, an agreement to which the Pope is a party, is not a treaty, nor is a *convention* between a sovereign state

and an individual. An agreement between two kings on a private matter is not a treaty. Unlike a private contract, a treaty is not void because it is made under duress, that is, if one of the parties uses force. The cession of a province, after the enemy has taken it by force of arms, is incontestable, except again by force of arms. Also, unlike a private contract, a treaty does not go into effect until it is *ratified*; for example, if the United States ambassador negotiates a treaty with Great Britain, the treaty does not become effective until it has been approved by the United States Senate and by the British king.

Kinds of Treaties. Treaties may be divided into several classes, according to their purposes. The following divisions are arbitrary, and a treaty may frequently include clauses under several classes:

(1) *Political*, such as treaties of peace concluding a war, treaties of defensive or offensive alliance, agreements for cessions of territory, or for arbitration of disputes. Agreements for the exchange of prisoners, for truces, or the surrender of an army are wrongly called treaties; but an agreement finally ending a war is rightly a treaty. In this connection, reference is often made to the *status quo*, a Latin

phrase which literally means the *state in which*. Thus, if a treaty is said to leave things *in status quo*, the expression means that things are left as they were, or in the *state in which* they had been.

(2) *Commercial*, including agreements referring to customs tariffs, navigation, fisheries, and consular service.

(3) *Confederations*, such as the Zollverein, the Latin monetary union, and the International Postal Union.

(4) Agreements relating to the extradition of criminals.

(5) Civil justice, relating to the protection of trade-marks, copyrights, and patents in foreign countries, and the rights of alien residents of a country.

Negotiations. In monarchies, the treaty-making power is usually vested in the Crown, which may conduct negotiations through an envoy specially appointed, or through the ordinary diplomatic representatives (see DIPLOMACY).

In Great Britain, neither house of Parliament has any power over treaties. Canada has won for itself the right to negotiate commercial treaties, but in political matters it is bound by the British treaties; commercial agreements are made by the Governor-General and his Privy Council, and must be ratified by the Dominion Parliament. In republics, the chief executive usually possesses the power to make treaties. In France, the approval of both chambers of the National Assembly is necessary if the treaty involves the appropriation of money or in any way affects commercial relations.

In the United States, the Constitution (Art. II, Sec. 2) grants to the President the "power, by and with the advice and consent of the Senate, to make treaties, provided two-thirds of the Senators present concur." The separate states are forbidden to enter into treaty agreements with foreign countries, or even with each other. Actual treaty negotiations are in the hands of the Department of State, sometimes through special envoys, but more often through the ambassadors or ministers abroad. In practice, the Senate has almost never been asked for "advice"; its share in the making of treaties is confined to the "consent," which is not always forthcoming, in which case the treaty fails.

Language Used. Until the eighteenth century, almost all treaties were written in Latin, which was the official or diplomatic language of Europe. Even treaties between states having a common language were usually in that language. In recent times, French is frequently employed in making treaties, but it has also become customary to write them in the languages of the treaty-making nations.

Enforcement of Treaties. It was formerly the practice of all nations to give hostages for the performance of treaty obligations. The ancient Egyptians, the Hebrews, the Greeks,

and the Romans followed this custom, which has been abandoned in modern times. The last example of this practice occurred in 1748, when two British peers were sent to France as hostages to insure the return of Cape Breton Island (Nova Scotia) to France. The hostage was practically a prisoner of war; if the treaty was not carried out, he was punished, even to death. Since the eighteenth century, the fulfillment of a treaty rests on the good faith of the nations who are a party to it, although it must be admitted that a powerful army or navy has sometimes been a threat to secure treaty rights. A nation injured by the failure of another nation to carry out a treaty has had no recourse except in war. When, in 1914, World War I engulfed Europe, there was much discussion in Germanic circles to the effect that a treaty is only "a scrap of paper." If such a thought dominates those who control the destinies of nations, and other powers remain quiet when treaty rights are violated, then a treaty is only binding in "political fair weather," and all nations must be ready to fight to uphold their rights. For a time after the war, it seemed as if the strong nations would unite to force respect to treaty obligations, which was one of the objects of the League of Nations, but events leading up to World War II (which see) beginning in 1939, destroyed any immediate hope of such a union.

Termination. A treaty may be terminated in various ways. It may be *abrogated* (literally, "called off") by mutual agreement, or it may contain a clause giving either party the right to cancel it after due notice. If one of the parties disregards its provisions, the other may *denounce* it, and refuse to be bound by it. If the conditions become physically impossible of fulfillment, the treaty is void. If we suppose, for example, that the straits of the Dardanelles by treaty are opened (as is the case) to the ships of all nations on equal terms, the treaty will be valueless in case the Dardanelles should become unnavigable. In case of war, most treaties are merely *suspended*, or temporarily not in effect, but commercial treaties, in such circumstances, are void, and must be renewed after the war.

Ecclesiastical Treaties. These are not treaties between ecclesiastical authorities, but treaties entered into by sovereign states and bearing upon the right of citizens or subjects of one state to the exercise of their religion within the boundaries of another. Among the Western nations, where freedom of worship prevails, no difficulties exist; a man may practice his religion as freely in a foreign land as in his own. But the question has arisen frequently in connection with missionary enterprises—indeed, missionary work cannot be carried on successfully in any pagan country which refuses to make ecclesiastical treaties.

In various non-Christian sections of the world, Christian missionaries are often allowed by treaty to teach the principles of Christianity, if they do so peaceably; in some countries, on the other hand, foreign residents are permitted to practice their religion unmolested, but are forbidden to try to secure converts to their faith.

E.D.F.

Related Subjects. The principal treaties among nations are listed in these volumes under their respective headings. The reader is also referred to articles on the following treaties or agreements made by the United States with foreign powers:

Armaments, Limitation of	Treaty with China (see
Clayton-Bulwer Treaty	BURLINGAME, ANSON)
Four-Power Agreement	Treaty with Panama (see
Guadalupe Hidalgo, Treaty of	PANAMA (History))
Hay-Pauncefote Treaty	Treaty with Spain (see
Jay Treaty	FLORIDA (History))
Louisiana Purchase	Washington, Treaty of
Paris, Treaties of	Webster-Ashburton
Renunciation of War	Treaty

TREATY FOR RENUNCIATION OF WAR, GENERAL. See RENUNCIATION OF WAR, GENERAL TREATY FOR.

TREATY PORTS, a number of port cities in China through which, in normal times, commerce is carried on with foreign countries, under treaty provisions.

Prior to 1842, trade with China was conducted without government permission or protection. In that year, a treaty was entered into by Great Britain and China, providing that five ports, Canton, Amoy, Fu-chau, Ningpo and Shanghai, should be open to foreign trade. Since that time, similar treaties

have been made with other nations, and prior to the outbreak of the Sino-Japanese War, there were about sixty-nine treaty ports in China. Most of these agreements were obtained from China as concessions following wars or other disagreements with various powers.

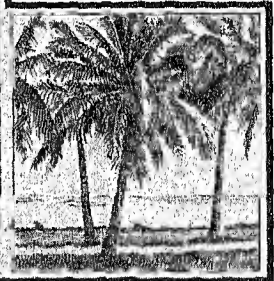
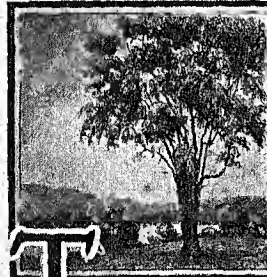
A characteristic of these ports was that foreigners enjoying their privileges were not under jurisdiction of Chinese laws and customs regulations. Following the Revolution of 1912, China sought to put an end to these unequal treaties. At the close of World War I, Russia gave up her rights in China, and Germany and the other defeated powers had theirs taken away. In 1929 Mexico voluntarily abandoned her privileges in China, and in 1943 the United States and Great Britain signed treaties relinquishing their extraterritorial and other special rights there. Britain's treaty did not affect Hong Kong. See CHINA (Commerce).

TREATY TO OUTLAW WAR. See the article RENUNCIATION OF WAR, GENERAL TREATY FOR.

TREBIZOND, *treb' ih zond.* See TURKEY (The Cities).

TREBLE, *treb' l,* the highest of the parts in harmonized music, such as are sung by women or boys, or played by instruments like the violin, flute, clarinet, and oboe, or played on the higher keys of the piano or organ. *Treble clef* is the term applied to the character used in

designating the treble staff. For illustration and description, see MUSIC (A Lesson on the Staff).



The STORY of TREES

TREE. "The groves were God's first temples," and in the presence of the trees one finds peace, quietude, and inspiration. Although trees benefit us in a multitude of practical ways, providing shade, clothing, shelter, and food, we never lose the feeling that they are the noblest members of the plant world. The majesty of straight-columned, tall-growing trees furnished the inspiration for the Gothic cathedrals of Europe, those impressive churches whose vaulted arches seem to lose themselves in the very heavens. And so in the presence of beautiful trees, man realizes his limitations and says with the poet Joyce Kilmer:

I think that I shall never see
A poem lovely as a tree.
A tree whose hungry mouth is pressed
Against the earth's sweet flowing breast.
A tree that looks at God all day
And lifts her leafy arms to pray;
A tree that may in summer wear
A nest of robins in her hair;
Upon whose bosom snow has lain;
Who intimately lives with rain.
Poems are made by fools like me,
But only God can make a tree.

A Tree and Its Parts. The thick, woody, self-supporting stem of a tree differentiates it

from other kinds of plants. Shrubs, it is true, have woody stems, but shrubs usually send up several stems from a main root, and most trees send up but one, which we call the trunk. Trees are also larger than shrubs, though it is difficult to say exactly how tall a shrub must be to be called a shrub and not a tree. Some authorities make ten feet the limit. Trees are perennials, and live on from year to year, indefinitely. The great trees of the *Sequoia* genus, in California, are the oldest living objects in the world. Some of

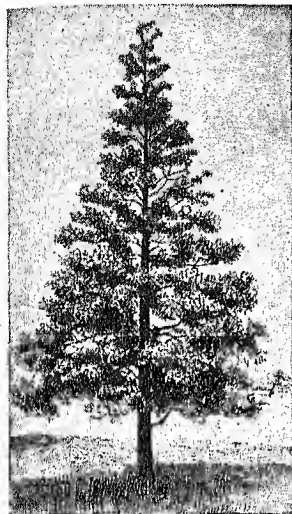


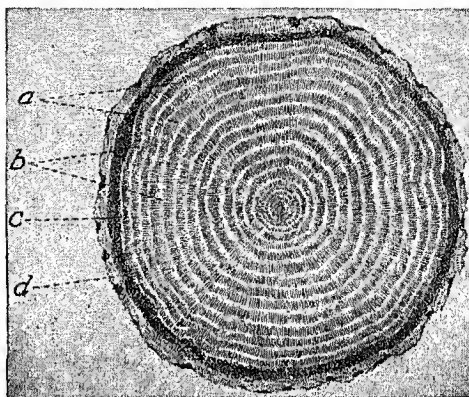
FIG. 1

them are thousands of years old and still in vigorous condition (see subhead, below).

Besides the trunk, or bole, the principal parts of a tree are the roots and the crown. The roots extend downward deep into the earth. They supply the tree with water and the plant food taken from the soil, and hold it firmly in position. The root systems of trees vary with the size and shape of the crown. A tree having a large, spreading crown, such as the elm, for instance, has a larger root system than one whose crown is cone-shaped, like that of the pine or fir. The root system of a tree with a large crown is subjected to an enormous strain in case of a strong wind, and it must be large enough to keep the tree from being blown down.

Trees are divided into two general classes, according to the plan of the bole. In those of

the first class, the bole extends the entire length of the tree without division. Examples are the pine, fir, and hemlock, among the evergreens; and the beech, among deciduous trees (that is, those that shed their leaves in the fall). This plan is shown in Fig. 1. In trees of the other plan, the bole divides into branches, forming a large crown, as seen in the elm, oak, and maple. This is shown in Fig. 2. The shape of the crown depends upon the plan of the bole. Trees of the first plan are nearly always conical when allowed to grow unhindered, but in pine forests the trees are so close together that the



AGE OF A TREE

Cross section of a tree showing rings of annual growth:

- | | |
|------------------------------|------------------------------|
| (a) Rings of annual growth | (c) Interior layer of bark |
| (b) Boundaries between rings | (d) Hard plates of dead bark |

lower branches die, leaving a long, naked trunk which bears a few branches at the top. In cool climates, the elms furnish the best examples of the branching bole, because the crown is usually symmetrical and graceful.

How to Study Trees. One need not be a scientist to know something about trees, and their study affords much pleasure. In the first place, begin with the trees in your locality. Select one tree, and study it through the year. The time for beginning this study is not especially important, provided you continue your observations to the same date in the following year, but your observations should be directed to the feature that is the most prominent at the time. If the tree is in blossom when it first interests you, study the blossoms; if the leaves have fully developed, study them. Should the observations begin in the winter, study the bole, branches, and bark. The flowers and fruits are of special interest. Do the flowers appear before the leaves? Are they large and showy, or small and apparently insignificant? How does the tree scatter its seeds? Are the seeds enclosed in a bur? Are the seeds of value to man? If so, for what are they used? Study the wood. Provided you can do so without



FIG. 2

Tree with divided bole.

injuring the tree, procure specimens. Can you tell the different kinds of lumber by the grain, as pine from spruce, and oak from beech and maple? Small pieces of boards that will enable you to make this study can easily be obtained at carpenter shops.

The Age of Trees. Each year the hardwood or the softwood tree records its age by adding a layer of new wood to its bole and branches. When the bole of one of these trees is cut across and the surface made smooth, these rings can be counted, so that it is easier for us to determine the age of a tree than that of any other thing that has a long life. Many trees are living witnesses of a distant past, and have recorded in their boles events that took place about them. The average life of nearly all classes of trees is more than a hundred years, and many live several centuries. Though the tree grows as long as it lives, it grows more slowly after reaching maturity. The oak, for example, reaches maturity in 120 to 200 years; after that, the annual layers of wood are very thin. The oak is said to live a thousand years. As Dryden expresses it:

Three centuries he grows and three he stays
Supreme in state; and in three more decays.

The Charter Oak must have stood several centuries when, in 1687, the charter of Connecticut was concealed within it. This tree was blown over in 1856. The Washington Elm was an old tree when Washington, in 1775, took command of the American army under its protecting shade; it stood until 1923. Many of the great trees in the region of the Rocky and Cascade mountains are from 800 to 1,000 years old. In 1900 there was felled a giant California redwood that began its existence in 271 B.C. A scientific study of the trunk of this tree revealed many interesting facts in its history.

It was 1,763 years old when Columbus discovered the New World, and some of the "big trees" are older than this (see SEQUOIA).

"Of our swift passage through the scenery
Of life and death, more durable than we,
What landmark so congenial as a tree,
Repeating its green legend every spring,

And with a yearly
ring
Recording the fair
seasons as they
flee,
Type of our brief
but still renewed
mortality?"

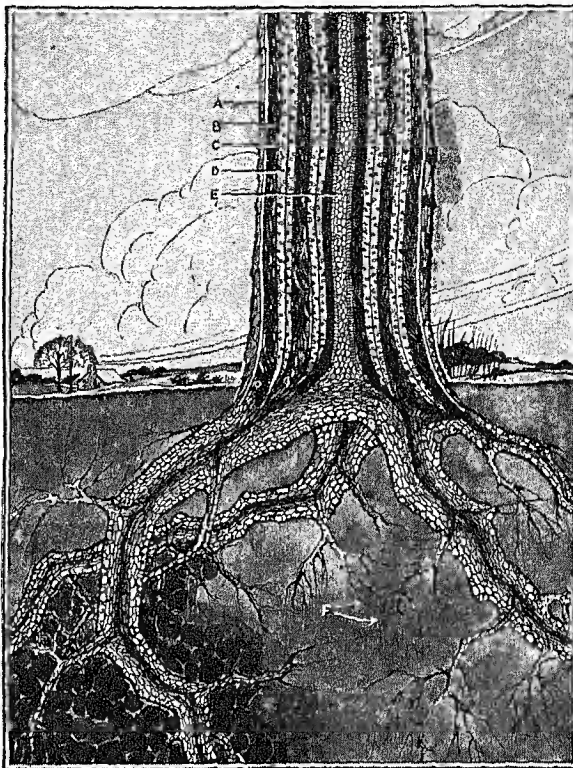


DIAGRAM OF ROOTS AND CELLS

(a) Cortex, the outer bark. (b) Cambium, soft tissue. (c) Woody fiber. (d) Dotted ducts. (e) Pith. (f) Root hairs.

Trees are subject, like other plants, to the attacks of insects and to the effects of fungi and bacteria. Considerable damage is done to standing timber by wood-rotting fungi, some of which cause young wood and bark to decay, and some of which affect the heartwood. When trees are exposed to plant enemies of this nature, they may not live their allotted number of years. See FUNGI.

Planting Trees. The following suggestions will be found helpful to those who have

not had experience in planting trees:

1. See that the soil is suited to the tree. Trees often die because they are taken from a locality having a different soil from that to which they are transplanted. Fall is a good time in which to plant young trees.

2. Make the hole large enough to spread the roots out in their natural position. Make it so deep that the tree will be about three inches lower in the ground than it was in its former position.

3. Have the soil finely pulverized and moist, but not wet. Work the soil around the rootlets with the hand, so that all the rootlets will come in contact with it. Fill the hole with earth, shaking it in loosely, and then tramp in firmly with the feet.

4. After filling the hole, drive three stakes firmly into the ground about a foot from the tree. Wind a piece of cloth around the tree on a level with the top of the stakes, and brace the tree firmly by winding a strong cord around it and tying this to each stake.

5. Cut off the ends of the branches and of the trunk, to prevent growth the first year.

6. Keep the soil moist throughout the season, but do not use so much water as to make it muddy, since this will "drown the roots." G.M.S.

Related Subjects. The following general articles and descriptions of trees will be of interest in connection with this discussion of trees:

Acacia	Judas Tree
Ailanthus	Juniper
Alder	Laburnum
Arbor Vitae	Lancewood
Ash	Larch
Aspen	Laurel
Balm of Gilead	Leaves
Balsa	Lignum-Vitae
Banyan	Linden
Basswood	Locust
Bay Tree	Lumber
Beech	Mahogany
Birch	Mangrove
Bird's-Eye Maple	Maple
Botany	Mountain Ash
Bottle-Tree	Mulberry
Box-Elder	Nettle Tree
Box Tree	Nut (with list)
Cabbage Palm	Oak
Cacao	Osage Orange
Cannon-Ball Tree	Palm
Catalpa	Palmetto
Cedar	Palmyra Palm
Cocoa (The Tree)	Pepperidge
Cone-Bearing Trees	Pepper Tree
Cork	Pimento
Cottonwood	Pine
Cypress	Plant
Date and the Date	Poplar
Palm	Prickly Ash
Deciduous Trees	Roots
Dogwood	Rosewood
Doom Palm	Sandalwood
Ebony	Sassafras
Elm	Seeds
Eucalyptus	Sequoia
Evergreen	Shrub
Fir	Sorrel Tree
Forests and Forestry	Spruce
Fringe Tree	Stem
Fruit (with list)	Sycamore
Ginkgo	Tallow Tree
Hawthorn	Tamarack
Hemlock	Tamarind
Holly	Teak
Honey Locust	Tulip Tree
Horse-Chestnut	Upas
Ironwood	Willow
Ivory Palm	Yew

TREE, SIR HERBERT BEERBOHM (1853-1917), an English actor and theatrical manager, widely known for his productions of Shakespearean plays. In most of these, he himself played leading rôles. He was born in London, where his father, Julius Beerbohm, was in the merchandise business. Young Herbert made his first professional appearance on the London stage in Boucicault's *Grimaldi*, in 1876, and about that time added Tree to his original name, for use on the stage. For several years he attracted no special attention, but in 1884 suddenly gained international fame by his impersonation of the Rev. Robert Spalding in *The Private Secretary*. His accurate imitation of the typical English clergyman became

the talk of London theatergoers, and his services were at once in demand by numerous managers, not only in England but in America, as well.

During the next three years, he created the leading rôles in Hugh Conway's *Called Back* and Sir Charles Young's *Jim the Penman*. He then became his own manager, took charge of the Comedy Theater in London in 1887, and immediately made a great success of Tristram's drama, *The Red Lamp*. Within a few months he assumed management of the famous Haymarket Theater in London, and for many years played to crowded houses.

Tree took charge of Her Majesty's Theater in London in 1897, opening it with *The Seats of the Mighty*. He produced new plays with a versatility which astonished dramatic students, and which, after the death of Sir Henry Irving in 1905, secured for him the rank of the greatest living British actor. His interest in the stage and its people inspired him to open a school of dramatic art, for young actors, in 1907, and in 1909 he was created a knight by King Edward VII. In 1916 Sir Herbert made a successful tour of the United States, appearing in *Henry VIII* and *The Merchant of Venice*, and in a successful revival of Du Maurier's *Trilby*.



Photo: U & U

SMALL FROG WITH A POWERFUL THROAT

This tiny tree frog, it is claimed, can be heard a mile when weather conditions are favorable, but this statement is open to grave doubt.

TREE FROG, OR TREE TOAD, a small tree-dwelling frog. The toes of tree frogs have soft pads on the tips, which act like suckers.

and help them cling to smooth bark. Most of the tree frogs have the power to change color through a range of grayish-browns and greens, according to their surroundings. Like all other frogs, they are harmless, and extremely useful as destroyers of insects. Their breeding habits are various and interesting. In Brazil there is a species in which the female deposits the eggs in a round mud nest on the bottom of a pond. The females of other South American species have pouches in which the eggs are placed and the tadpoles develop. Some species place the eggs on trees above pools, and the tadpoles, when hatched, slip down into the water. M.J.H.

TREE OF HEAVEN. See *AILANTHUS*.

TREE OF LIFE. See *ARBOR VITAE*.

TREE OF THE UNIVERSE. See *YGGDRASIL*.

TREE-PLANTER STATE. See *NEBRASKA*.

TREE SHREW, an insectivorous, arboreal animal native to Oriental regions. The exceedingly rare pygmy tree shrew is believed to be the root of the primate stock. It is squirrel-like in appearance but is related to the shrew (which see).

TREE TOAD. See *TREE FROG*.

TREFOIL, meaning *three-leaved*, is the name generally applied to various plants having compound leaves in three parts, like the clover. It is specifically applied to the *Lotus* group, a genus belonging to the legume family. Several species of this group are found in the temperate parts of the northern hemisphere.

Bird's-foot trefoil, so called because it bears clusters of pods somewhat resembling a crow's foot, has prostrate stems, yellow flowers with a honey-like scent, and leaves divided into three leaflets. It is sometimes identified with the Irish shamrock, and grows commonly in European meadows and in the United States, especially the South. Among other species are the *winged pea*, which southern Europeans use in salads; and *marsh bird's-foot*, common in damp meadow land. In art, *trefoil* is a three-lobed decorative figure. B.M.D.

Scientific Names. The trefoils belong to the family *Leguminosae*. Bird's-foot trefoil is *Lotus corniculatus*; the winged pea, *L. tetragonolobus*; marsh bird's-foot, *L. uliginosus*.

TREK, THE GREAT. See *UNION OF SOUTH AFRICA*; *CAPE TOWN*.

TREKBOK. See *SPRINGBOK*.

TREMBLING POPLAR. See *ASPEN*.

TRENCH WARFARE. See *WORLD WAR I*.

TRENT, COUNCIL OF. After the development of the Protestant Reformation, Roman Catholic authorities felt the need of a great council for the restatement of the fundamental doctrines of the Church. From the very beginning of the Reformation, both Reformers and Catholics demanded a general council of the church. Reformers wanted all Christians to be represented, so that disputed doctrines

might be discussed and ecclesiastical abuses renounced. After many delays, a council was called at Trent, a city of the Austrian Tyrol, in December, 1545, by Pope Paul III. Wars and religious disturbances also interrupted the sittings, and the work of the Council of Trent was not completed until 1563, when its decrees were confirmed by Pope Pius IV. The result of the Council was merely a reaffirmation of Roman Catholic doctrines. It reaffirmed the doctrine of granting indulgences, but corrected some of the defects in regard to practice, and decided several other important questions. The decrees of the Council of Trent are now regarded as authoritative statements of Roman Catholic creed and practice. R.J.P.

TRENT AFFAIR, THE, an episode of the War of Secession, of historic importance chiefly because it involved the old question of the right of search. In the fall of 1861, the Confederate States of America commissioned John Slidell and James M. Mason to go to France and England, to secure the aid of those countries for the Southern cause. The British mail steamer *Trent* took them aboard at Havana. On the eighth of November, the *Trent* was halted by the United States ship *San Jacinto*, under Captain Charles Wilkes, and the commissioners were taken prisoner and carried to Fort Warren, in Boston harbor.

Though the people of the North approved of this act, it was recognized as a breach of international law by President Lincoln and Secretary of State Seward. The President said, "We fought Great Britain in 1812 for insisting on the right to do precisely what Captain Wilkes has done." Accordingly, in response to England's demand, the American government ordered the commissioners released, and made a formal apology. In the diplomatic correspondence, Secretary Seward congratulated England on having become an advocate of the principle to which America had long ago given assent. The commissioners went to London, but accomplished nothing.

Related Subjects. The reader is referred to:

Mason and Slidell
Search, Right of

War of 1812
War of Secession

TRENT CANAL. See *CANADA* (Transportation).

TRENTINO, *tren te' no*, a section of Venezia Tridentina (formerly the Italian Tyrol). See *TYROL* (Venezia Tridentina).

TRENTON, BATTLE OF. See *REVOLUTIONARY WAR*.

TRENTON, N. J., the capital of the state and the county seat of Mercer County, is at the head of tidewater navigation, on the east bank of the Delaware River. It is thirty miles northeast of Philadelphia and fifty-five miles southwest of New York City. Trenton has an area of 8.5 square miles, including 266 acres

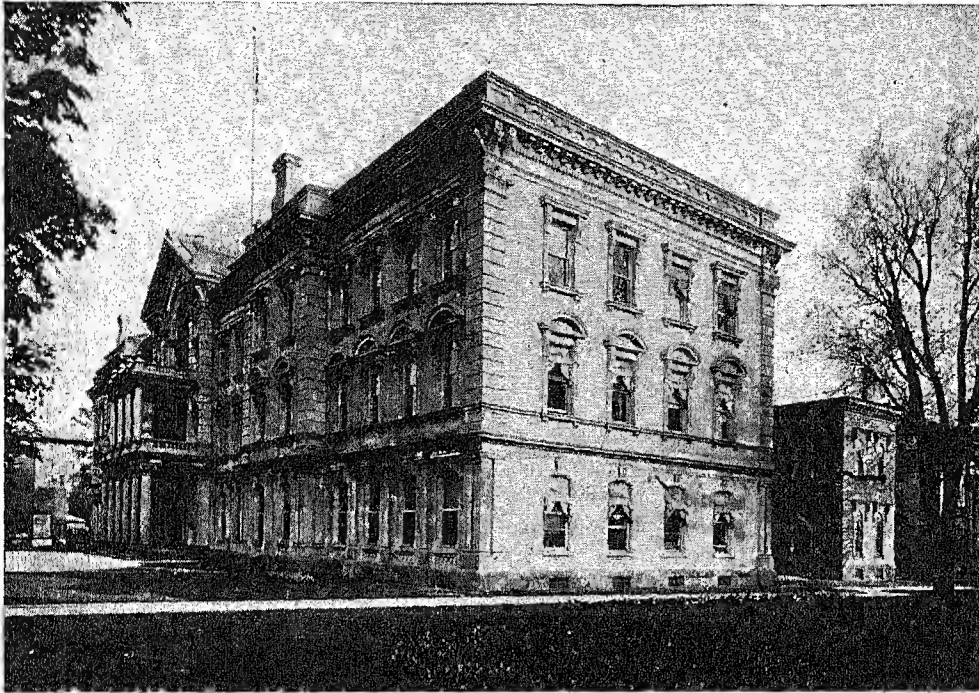


Photo: Keystone

THE STATE CAPITOL AT TRENTON

of public parks. A marine terminal, wharves, and warehouses have been built by the city. Population, 124,697 (1940).

Trenton has many landmarks and buildings of historical interest. In the center of the city is Battle Monument, a granite shaft 150 feet high, surmounted by a colossal statue of Washington; it marks the spot where Washington stationed his guns on the battlefield of Trenton, on December 26, 1776, after crossing the Delaware eight miles above Trenton on the previous night. The State House stands on high ground not far from the river; in Mahlon Stacy Park, adjoining the capitol grounds, are the Hessian barracks, erected by the colony in 1758 to lessen the evils of billeting, and occupied at different times by British, Hessian, and American troops during the Revolutionary War.

Transportation. The city is served by the Pennsylvania and the Reading railroads, and by many local and interstate motorbus and truck lines, and by small steamers and barges on the Delaware River affording a twenty-five-foot channel deepened and maintained by the Federal Government. It is on the Lincoln Highway, and has a county airport.

Industry. As an industrial city, Trenton has over 300 manufacturing establishments, including about forty potteries, and is especially noted for its clay products. Sanitary ware, floor and wall tile, and electrical porcelain specialties are produced. The wire mills and metal industries produce wire cloth, structural iron, cables, automobile body hardware,

turbines, machinery, refrigerators and showcases, radiators, upholstery and automobile cushion springs, and chains. Trenton is an important center of the rubber industry, and there are factories producing linoleum, clothing, cigars, electric lamps, luggage, food products, and candy.

Education. Trenton is situated within easy distance of numerous institutions for higher education, including Princeton University. Within the city are a state normal school, the state library, and the state school for the deaf.

Institutions. State institutions in Trenton include the home for girls, a hospital for the insane, the state prison, and the state arsenal. Outside of the city limits there is the Trenton municipal colony, with the city's institutions for the care of the sick and aged, and a city farm.

Trenton is the see of Roman Catholic and Protestant Episcopal bishops, and has 100 churches of all denominations.

History. The site of Trenton was known as a post for trade between the Indians and Dutch and Swedish colonists, as early as 1664. In 1680 Mahlon Stacy, a Quaker, made the first settlement by erecting a mill on the river bank, and the place became known as The Falls, on account of the rapids in the river, with a fall of eight feet at this point. Stacy sold his plantation in 1714 to William Trent, later chief justice of the colony, and in 1719 the name Trent-town, or Trenton, was adopted. The settlement was incorporated as a borough in 1745. A provincial congress of New Jersey met here in 1775, and in December, 1776,

Trenton was the scene of one of the important battles of the Revolutionary War, when General Washington crossed the Delaware River and took more than 1,000 prisoners. In 1783 Trenton was proposed as the seat of the Federal government, and in November, 1784, Congress met there for a brief period. It became the capital of the state of New Jersey in 1790, and in 1792 it was chartered as a city. The commission form of government was adopted in 1911.

W.O.L.

TRENT RIVER, next to the Thames and the Severn, the most important stream in England. It rises on the northwestern border of Staffordshire, and winds northeasterly through the counties of Derby, Nottingham, and Lincoln, until it meets the Ouse. These two streams unite to form the Humber. The Trent is 170 miles long, and is navigable for barges for 120 miles.

Through the Nottingham woods, watered by the Trent, Robin Hood used to roam and hunt, and on its banks is Stoke-upon-Trent, the center of a group of pottery towns which Arnold Bennett, in his novels of the "Five Towns," used for local color. See BENNETT, [ENOCH] ARNOLD.

TREPANG (the Malay *tripang*), is the commercial name for the dried bodies of certain species of marine animals commonly called *sea cucumbers* (which see). An active trade in trepang is carried on in the East Indies. Sea cucumbers have soft, wormlike bodies, varying from a few inches to two feet in length. Preparation for the market includes removal of the internal parts, boiling of the bodies, soaking them in fresh water, and smoking or drying them in the sun. The product of these processes is a rubber-like substance, which is used to thicken soups. Though it is practically tasteless, trepang is nutritious. Macassar, a seaport of Celebes, in the Dutch East Indies, is the chief center of the industry. Large quantities from that city are exported yearly to China. There is also a local trepang industry in California, conducted or encouraged by the Chinese there.

S.H.S.

TREPHING, *tre fi' ning*, or **TREPANNING**, *tre pan' ing*. These terms are applied to the surgical operation of making a small perforation in the skull, and they also refer to the instruments used. A trepan is a small cylinder with sharp cutting teeth on the edge. A trephine is an improved form of trepan. It has a handle placed horizontally, like that of a gimlet, and a sharp steel center pin, which projects slightly below the edge of the cylinder. The pin, when fixed on the part of the bone to be opened, forms an axis for the rotating edge of the instrument. The pin is removed when a sufficiently deep groove has been cut for the instrument to work steadily. The trepan makes complete revolutions, but the trephine

operates through semicircular movements to the right and left. Usually, a small opening less than an inch in diameter is made, and, if desired, the perforation is then enlarged with other instruments. In many cases, trephining is merely the preliminary step in operations which require the turning back of large sections of bone, as in the removal of tumor or abscess from the brain. The operation is frequently resorted to in cases of skull fracture and pressure on the brain. See SURGERY.

TRESPASS, in law, is unlawful entrance upon the property of another, or injury to the person of another. Trespass signs are seen commonly where owners of groves, private estates, and club grounds desire to protect their property from intrusion; disregard of such notices is an unlawful act. Trespass makes one liable to a civil suit for damages.

There are various other forms of trespass, such as injuring a neighbor's property by allowing cattle to get into his cornfield, throwing a stone and breaking his window, or posting a sign on his property without permission. A person who creates a disturbance in an assemblage, and refuses to leave when ordered to do so by the management, is a trespasser; he may be ejected, without return of his admission fee, and prosecuted.

Motive does not usually protect a trespasser from action against him. That is, the act of trespass may be done without malice, unintentionally, or through ignorance, but the offender is nevertheless liable to the payment of damages. On the other hand, if the offender commits an act of trespass maliciously, his motive is considered in the matter of allowing damages. False imprisonment and assault and battery are examples of trespass to the person. *Poaching* is a term for trespass upon land for the purpose of obtaining game and fish. Action for damages in cases of trespass comes under the law of torts. See ASSAULT AND BATTERY; FALSE IMPRISONMENT; TORT.

TRESTLE. See BRIDGE (Timber Bridges).

TREVITHICK, *trev' ih thik*, RICHARD. See LOCOMOTIVE.

TRIAD CHORD. See MUSIC (A Lesson on Harmony).

TRIAL. See COURTS; JURY AND TRIAL BY JURY.

TRIAL BALANCE. See BOOKKEEPING.

TRIAL BY BATTLE. See ORDEAL AND COMBAT, TRIAL BY.

TRIANGLE, *tri' an g'l*, a plane figure having three straight sides and hence three corners, each of which is called a *vertex* (plural, *vertices*). Triangles are classified according to their sides and according to their angles. One whose three sides are equal is an *equilateral* triangle; one which has two sides equal is an *isosceles* triangle; one that has no two sides equal is a *scalene* tri-

angle. A triangle that has a right angle is a *right triangle*; one that has an obtuse angle is an *obtuse triangle*; one that has all its angles acute is an *acute triangle*. Any side of a triangle may be called the *base*. The distance from any vertex to the opposite side is called an *altitude*. In a right triangle, the side opposite the right angle is called the *hypotenuse*.

Construction of Triangles. To the young student, the construction of triangles leads to many interesting and valuable discoveries. He finds that he cannot have a triangle with any angles he chooses, but only angles whose sum is 180° ; he can have but one right angle or but one obtuse angle in a triangle; he finds that he can choose the size of two angles, providing they are not too large, but the third one is then determined for him; he finds that he can decide upon a certain number of sides and angles, and the remaining sides and angles are thereby determined. Such construction work can be done with much interest and economy in the sixth, seventh, and eighth grades. Indeed, the very keenest interest in it is found in the sixth grade. It opens the way to the more abstract demonstrative geometry of high school. The student should have a rule, a pair of compasses, and a protractor for this work. Below are a few suggestions as to problems for the student:

1. Construct a triangle with a base of 8 inches, one base angle 50° and the other 70° . Can you make the other two sides of the triangle any length you please? Can you make the third angle any size you please?

See that one side and the two adjacent angles determine the triangle.

2. Construct a triangle, one side 10 inches, another side 6 inches, and the angle included between these sides 60° . What do you find about the third side and the other two angles? Did you choose their length or size?

See here another geometric truth—two sides and the included angle determine a triangle.

3. Draw a right triangle; note the position of the sides. The longest side is opposite the right angle. Draw an obtuse triangle. Where is the longest side? In each triangle you have drawn, where is the longer side?

See that these longer sides are opposite larger angles.

4. Draw an equilateral triangle. Draw one side any length; letter the line *a* at one end, *b* at the other. Take compasses and with *a* as a center, and the radius *ab*, draw an arc; with *b* as a center, and the same radius, draw another arc. Letter the point where the arcs intersect *c*. Draw straight lines from *c* to *a* and *c* to *b*. Measure the angles of this triangle. What do you find?

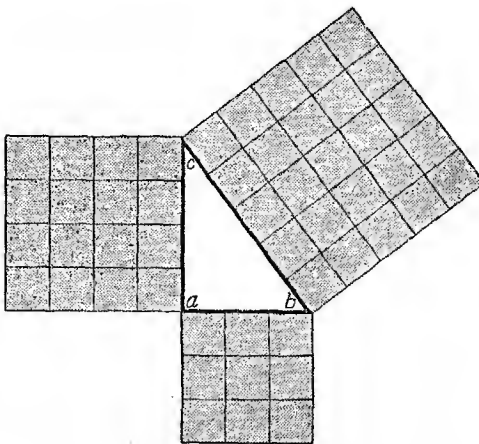
5. Repeat Problem 4, but change length of first side.

The Pythagorean Theorem. The relation of the sides of a right triangle has been known for many centuries. Pythagoras proved, about

500 B.C., that *the square on the hypotenuse of a right triangle is equal to the sum of the squares on the other two sides.*

Draw a right triangle, *a b c*, with the two perpendicular sides equal to three inches and four inches, respectively. Measure the third side, the hypotenuse.

Draw a square on the base line; draw a square on the altitude line; draw a square on the hypotenuse.



ILLUSTRATING THE PYTHAGOREAN THEOREM

How does the square on the hypotenuse compare with the other two squares?

Draw other right triangles and build squares on the sides. How does the square upon the hypotenuse compare with the other two squares in each case? The general truth is stated:

Hypotenuse² = (side)² + (other side)²
 $H^2 = B^2 + A^2$, if B and A represent the two perpendicular sides.

From this fact, any side of a right triangle may be found when the other two sides are known.

Problems. 1. What is the diagonal of a rectangular field 60 rods by 80 rods?

SOLUTION

$$\begin{aligned} H^2 &= B^2 + A^2 \\ H^2 &= 60^2 + 80^2 \\ H^2 &= 3600 + 6400 \\ H^2 &= 10000 \\ H &= \sqrt{10000} \\ H &= 100 \end{aligned}$$

Note: The diagonal of the field is the hypotenuse of a right triangle.

2. A baseball diamond is 90 feet square. How far is it from first to third base? Ans. $127.27 +$ feet.

3. How far out from a wall must a $12\frac{1}{2}$ -foot ladder be placed to reach a window 10 feet from the ground?

SOLUTION

$$\begin{aligned}
 H^2 &= A^2 + B^2 \\
 (12\frac{1}{2})^2 &= 10^2 + B^2 \\
 156.25 &= 100 + B^2 \\
 B^2 &= 156.25 - 100 \\
 B^2 &= 56.25 \\
 B &= \sqrt{56.25} \\
 B &= 7.5 \\
 \text{Distance} &= 7.5 \text{ ft.}
 \end{aligned}$$

When the two perpendicular sides of a right triangle are 3 and 4 or 4 and 3, the hypotenuse is 5, since $3^2 + 4^2 = 5^2$. Therefore, when the two perpendicular sides are in the ratio 3:4 or 4:3, the three sides are in the ratio 3:4:5. This fact has been used as the basis for laying out "square corners." The so-called "rope-stretchers" of Egypt are said to have used it in laying out the foundations of the pyramids, and the builder to-day uses it to lay out a foundation. A line 8 feet long is stretched from the desired corner point in the direction one wall is to take; a line 6 feet long is fastened at the same point, and stretched to make a right angle with the first line; a 10-foot pole is laid from the outer extremity of the 8-foot line, extending toward the outer extremity of the 6-foot line, which is moved until the 10-foot pole just fits between the extremities of the lines. Then the corner is a right angle.

When the perpendicular sides are in the ratio 3:4 or 4:3, it is very easy to know the hypotenuse; for example:

B	A	H
3	4	5
6	8	10
21	28	35
36	48	60

Find n in each of the following:

B	A	H
15	20	n
18	24	n
n	40	50
n	27	45
27	n	45
44	n	55
51	68	n
124	2	n

Triangular Measurements. The relations among the sides and angles of triangles make up a large part of the study of trigonometry. One of the objects of trigonometry is to find heights and distances without actually measuring them, as heights of mountains, widths of bodies of water, distance of vessels out at sea, astronomical distances, etc.

Area of Triangles. (a) When a base and corresponding altitude are known, to find area, multiply base by one-half altitude. (For full discussion of this, see MENSURATION.)

(b) When sides are known, but altitude is unknown, to find area, find one-half the sum of the sides; from this subtract each side sepa-

ately. Find the product of half the sum of the sides and the three remainders found above. Take the square root of this product.

Letting s stand for half the sum of the sides, and a , b , and c for the sides, respectively, we may state the law thus:

$$\text{Area } \triangle = \sqrt{s(s-a)(s-b)(s-c)}$$

Problem. Find the area of a triangular field whose sides are 21 rods, 28 rods, and 35 rods.

SOLUTION

$$s = \frac{21 + 28 + 35}{2} = 42$$

$$\text{Area } \triangle = \sqrt{s(s-a)(s-b)(s-c)}$$

$$\text{Area in sq. rd.} = \sqrt{42(42-21)(42-28)(42-35)}$$

$$\text{Area in sq. rd.} = \sqrt{42 \times 21 \times 14 \times 7} = 294$$

The student will find many opportunities out-of-doors for making and testing square corners by the rope-stretcher method, and for finding the relations between the sides of the right triangle. See MENSURATION. J.W.V.

TRIANGULATION. See GEODESY.

TRIANON, *tre ah nawN'*, TREATY OF, the treaty of peace concluded between the Allies and Hungary following World War I. and signed in the gallery of the Grand Trianon at Versailles, June 4, 1920. Patterned after the Treaty of Saint Germain, which settled the issues between the Allies and Austria, the Treaty of Trianon drastically limited Hungarian territory, reduced its population more than 7,500,000, alienated about 3,000,000 Magyars (which see), and left the country landlocked and dependent upon internationalized communications. Only after bitter protest and what modifications they could obtain, would the Hungarians consent to the terms, and the day the treaty was signed, Budapest went into deep mourning.

Hungary was compelled to recognize the territorial changes already made in setting off the frontiers of Austria, Czechoslovakia, Yugoslavia, and Rumania, and to forfeit all claim to Fiume. The military and reparation clauses were similar to those in the Treaty of Saint Germain, except that Hungary was allowed an army of 35,000. All merchant ships had to be surrendered, and reparations in kind were left for special committees to decide. Except for necessary and slight variations, the financial and economic clauses were equivalent to those of the Austrian treaty. See SAINT GERMAIN, TREATY OF; HUNGARY (Boundaries and People); WORLD WAR I.

TRIASSIC, *tri as' ik*, BROWNSTONE. See SANDSTONE.

TRIASSIC PERIOD, the earliest period of the Mesozoic Era, succeeding the Permian and succeeded by the Jurassic Period. It was

named from its threefold development in Germany, where it was first carefully studied. In most of North America and in parts of Western Europe, the Triassic rocks consist of conglomerate, sandstone, and shale, and are largely land or fresh-water deposits, resembling the Permian rocks. In regions where the two systems lie in conformable sequence, they are almost indistinguishable. In Southeastern Europe and Southwestern Asia, the Triassic strata, which there are largely marine limestones, reach a great thickness. In Eastern North America, the deposition of the strata was accompanied by considerable volcanic activity, especially the eruption of great sheets of lava. The cliffs of the northwestern coast of Nova Scotia, the Palisades of the Hudson, and the Watchung Mountains of New Jersey are formed by such lava sheets, which have been tilted since their eruption.

The Triassic Period was characterized by the abundance in the sea of cephalopod mollusks with coiled shells, known as ammonites, and by the dominance on land of reptiles, especially huge lizards. Remains of what may have been the earliest mammals are also found. The plant life was marked by the development of cycads and of coniferous trees.

L.LaF.

Related Subjects. The reader is referred in these volumes to the following articles:

Dinosaurla	Mesozoic Era
Geology	Permian Epoch
Jurassic Period	

TRIBUNE, the name given in ancient Rome to either of two officers whose functions were not in the least similar.

The Military Tribunes. These were originally the leaders of the soldiers furnished by the various tribes, and from this fact the name was taken. During the time of the republic, there were six tribunes to each legion, and they ranked next after the commander in chief. At first they were appointed by the consuls, but later part or all of them were elected by the people. Under the empire, the office declined in importance, and the tribunes came to be little more than the staff of the commander; this condition foretold their passing from the scene.

Tribunes of the People. Magistrates elected to protect the rights of the plebeians were known by this name. In 494 B.C., this class seceded from Rome and refused to return until permission was given to choose such officers [see **ROME** (Early Days of the Republic)]. At first there were probably only two tribunes, but later their number was increased to five, and at last to ten; they held office for one year only, but were eligible to reelection. The tribunes had the right to defend a plebeian against any charge; they might veto any measure proposed by the Senate; their persons were inviolable; and through these privileges they became in time the most powerful officers of the state. The gradual acquisition by the plebeians of many political rights which had originally belonged only to the patricians was largely the work of the tribunes. Augustus assumed the prerogatives of this office, and, beginning

with his reign, it lessened in importance. In the Middle Ages, Cola di Rienzi (which see), who bore this title, had a spectacular though brief career in Rome. He was made the hero of Bulwer-Lytton's novel, *The Last of the Tribunes*.

TRICEPS, *tri' seps*. See **MUSCLES**; **BICEPS**.

TRICERATOPS, *tri sehr' ah tops*. See illustration in article **DINOSAURIA**.

TRICHINA, *trih ki' nah*, an animal parasite which, when it finds lodgment in the human system, causes a serious disease known as *trichinosis*. The trichina is a minute worm which inhabits the muscles of pigs, rabbits, rats, and other animals. In these creatures, it exists as an undeveloped, hairlike organism coiled up in an enclosing sheath, or cyst, and it does not develop beyond this immature stage until it is taken into the human intestine. Human beings usually acquire trichinosis through eating uncooked or poorly cooked pork. As the meat is digested, the immature worms are freed from their cysts, and in two or three days reach maturity. About eight days later, the females, having penetrated the intestinal wall, give birth to fully developed larvae. Each worm produces from 1,000 to 1,500 of these. In countless numbers, the larvae pass through the intestinal wall and are carried by the blood vessels to the muscles, where they find lodgment. While in the muscle fibers, they increase greatly in size, and become encysted. In this form, they may remain in the muscle tissues for years. It has been estimated that, in a serious infestation, 50,000,000 larvae may enter the circulation. The muscles most heavily infested are those of the diaphragm, tongue, ribs, larynx, and eye.

Trichinosis. The first symptoms constitute the gastro-intestinal stage of the disease, when the adults and larvae are in the intestinal tract. Nausea, vomiting, and diarrhoea, with cramps, are present in severe cases. This stage of gastro-intestinal irritation develops within three days after the infested meat has been eaten. It is highly important that it be recognized, because at that time a few doses of wormseed or carbon tetrachloride, followed by a laxative, will cause the elimination of the worms. If the worms are not eliminated from the intestines, the larval forms invade the intestinal wall and migrate to the muscles, where they eventually become encysted.

Weeks after the infested meat has been eaten, trichinosis begins with a fever. This fever is sometimes suspected of being typhoid. There is headache. The soreness and aching of the muscles are so considerable as to suggest the invasion stage of smallpox. There follow some puffing of the face, and, at times, some drowsy. Diagnosis is made by examining the blood or by removing a small piece of a sore muscle and finding trichinae in it. The severity of the symptoms depends upon the number of larvae

ingested. If they are very numerous, death is probable. Otherwise, the patient may recover after the parasites become encysted. The only sure method of preventing this disease is to cook all pork and pork products thoroughly.

Encysted trichinae can be recognized in meat. Such meat is known as "measly pork." The larvae in meat do not withstand refrigeration or prolonged exposure to preservatives. Nevertheless, the injunction "Eat no raw pork or imperfectly cooked pork" is a wise one. See HOG; PARASITIC DISEASES. W.A.E.

TRICHOP-TERA, *tri kop' tur ah*. See INSECT (Classification).

TRICLINIC, *tri klin' ik*, **SYSTEM**. See CRYSTALLIZATION.

TRICOLOR, *tri' kul ur*, a name given to the French national flag, which has three colors, blue, white, and red, in equal vertical sections, the blue nearest the flagstaff, the white next, and the red at the outer end. It was introduced during the French Revolution, and is now the sole flag of France. Other nations have adopted tricolor flags, but they do not bear the distinctive name. See color plate, *Flags of Europe and Asia*, opposite page 2459.

TRICUSPID, *tri kus' pid*, **VALVE**. See HEART.

TRIDENT. See NEPTUNE.

TRIESTE, *tre es' tay*. See ITALY (The Cities).

TRIGLYCERIDS, *tri glis' ur idz*. See BIOCHEMISTRY (Substances in Animals and Plants).

TRIGONOMETRY, *trig o nom' e trie*, a branch of mathematics having to do with the measurement of triangles and with the relations of their sides and angles to one another. It follows geometry in the regular course of study, and depends upon certain truths there demonstrated. These are as follows:

That the sum of the angles of a triangle is always equal to two right angles; and that, if three parts of a triangle, at least one of which is a side, be known, the remaining parts may be computed.

The two chief divisions of trigonometry are *plane* and *spherical*. Plane trigonometry treats of such triangles as lie wholly in a plane, and

spherical trigonometry of triangles that lie upon the surface of a sphere. To facilitate the computations to which operations in trigonometry give rise, tables of logarithms (which see) have been prepared. They were added to the science

by Napier in the seventeenth century.

The practical uses of trigonometry are many and important. Plane trigonometry, for example, is used extensively in astronomy, physics, and engineering, and spherical trigonometry is used in astronomy and in measuring long distances on the surface of the earth, where its curvature must be taken into consideration. In

surveying, the science is used in determining distances, and in measuring the height of mountains and other lofty objects. See NAPIER, JOHN.

TRILBY. See DU MAURIER, GEORGE LOUIS.

TRILLIUM, or WAKE-ROBIN, the names of several species of plants belonging to the lily family. *Trillium*, from the Latin for *triple*, is a most appropriate name, for these plants have three sepals, three petals, two times three stamens, and three styles, and each flower blossoms from a cluster of three leaves. While *wake-robin* is a suitable name for the few species that blossom so early in the spring that they are said to be in time to "wake the robins," most of the trilliums bloom after the robins have arrived. These plants vary in attractiveness, but some of them are among our loveliest wild flowers. Generally, they prefer moist woodland soil. See color plate opposite page 4005.

Earliest to bloom is the dainty *dwarf trillium*, whose solitary pure-white flower appears at the end of a stem not over six inches high. Its range is from Pennsylvania to Minnesota and south to Kentucky. The *purple-flowered* species, which follows the dwarf trillium, has a dull-colored blossom and an odor suggesting carrion. It is common in the region about Washington, D. C. Much more attractive is the *large-flowered trillium*, found from Quebec to Florida and westward. Its blossoms are white at first, but gradually change to rose. This species is commonly cultivated for the florists' trade. Among the last to blossom is the *painted trillium*, so called because its wax-white petals have stripes of wine or deep pink.



Photo: Visual Education Service

TRICHINA SPIRALIS

Encysted in muscle; magnified 150 diameters.

The fruit of this species is a bright-red berry. Its range is from Maine to Wisconsin, south to Georgia and Missouri, and it flowers in May and June.

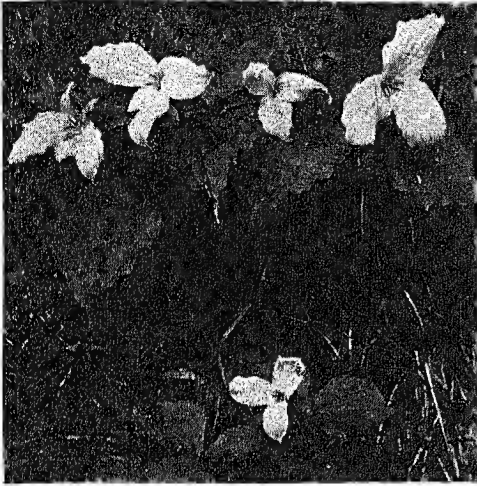


Photo: Visual Education Service

TRILLIUM, OR WAKE-ROBIN

Trilliums have fleshy roots which possess emetic properties. The berries of some species are thought to be poisonous. B.M.D.

Scientific Names. Trilliums belong to the family *Liliaceae*. The dwarf trillium is *Trillium nivale*; the large-flowered, *T. grandiflorum*; the painted, *T. undulatum*.

TRILOBITES, *tri' lo bites*, meaning "three-lobed," a group of marine fossil crustaceans (which see) found in Paleozoic deposits, and from this layer up into the Carboniferous in Europe and the Permian layers in America. They were found in South Wales in 1698, when

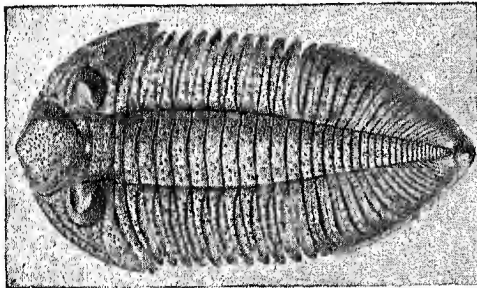


Photo: Field Museum of Natural History

A TRILOBITE FROM SOUTHERN ILLINOIS

A reconstruction drawing, showing the dorsal or upper side of a Devonian trilobite, *Dalmanites pratteni* Roy.

the curator of a museum said of the find that "it must be the Skeleton of a flat Fish." Their distribution appears to have been world wide, and thousands of species are known.

The trilobite is divided into three regions—

head, thorax, and abdomen or pygidium. They usually have a pair of compound eyes, although eyeless species are known. For a long time no appendages were discovered, but later many specimens with limbs were found. Trilobites are commonly from two to three inches in length, but some specimens are only a quarter of an inch long while others range up to twenty inches.

TRIMETER, *trim' e tur*. See METER.

TRINCOMALEE, *trin ko mah le'*, a town in Ceylon (which see).

TRINIDAD, the second largest island of the British West Indies, famous as the source of most of the world's supply of asphalt. It lies six miles east of the coast of Venezuela, near the mouths of the Orinoco River. It is larger



LOCATION MAP

The nearness of Trinidad to the mainland of South America is shown on the map in the west and in the southwest corner.

than the state of Rhode Island, for it is about 1,864 square miles in area, and, except for one projection, is very nearly rectangular. In the north and south, there are ranges of hills furrowed with many ravines and covered to the very top with dense forests. The most striking natural feature, excepting Pitch Lake, the asphalt lake, is Maracas Falls, where a river leaps in a torrent over a wall of rock 312 feet high.

Trinidad is an English crown colony, with the seat of government at Port of Spain, a fine city with a population of 93,405. The population of the island is 484,900 (1940). About a third of the people are East Indians, whose emigration from India has been encouraged by the English government. The upper classes are creoles of British, French, and Spanish blood; the rest are Negroes. English is the

language generally spoken in the towns, while in some of the agricultural districts, Spanish and French dialects predominate. Education is provided through state schools, and assisted schools under several religious denominations, 256 in all. There are seven colleges. All courses for primary schools must include agriculture, and in 1921 the Imperial College of Tropical Agriculture was instituted to train farm superintendents, planters, and specialists.

In 1498, on his third voyage to the New World, Columbus vowed to name the first land he sighted for the Trinity, and in this way Trinidad was named. The Spaniards colonized the island in the sixteenth century, and made occasional slave-hunting expeditions to it. The French came about 1775. England acquired the island by treaty in 1802. The natural resources have made it a valuable colony; asphalt, which for many years was the main export, has been far overshadowed by petroleum, and though the supply has only begun to be tapped, in 1935 more than 11,000,000 barrels (of thirty-five imperial gallons each) of crude oil were produced. The exportation of large quantities of tropical products assures the economic stability of Trinidad: cacao, sugar, rum, molasses, coffee, coconuts, copra, and grapefruit. Trinidad is an important deposit market for the West Indies, and has a large trade with the United States, South America, and near-by British colonies. There are telephone and telegraph communications, over 120 miles of railways and 1,200 miles of roads. In September, 1940, Great Britain leased sites on Trinidad to the United States for air and naval bases. See WEST INDIES; ASPHALT; UNITED STATES IN WORLD WAR II.

TRINIDAD, COLO. See COLORADO (map).

TRINITROTOLUOL, or T.N.T. See FULMINATION; EXPLOSIVES.

TRINITY, the conception of God as one, and yet as having a threefold personality, Father, Son, and Holy Spirit. The doctrine is a development of Christian theology, not being taught in the Old Testament, but capable of being deduced from passages in the New Testament. The first authoritative statement of belief in Father, Son, and Holy Spirit was made by the earliest general council of churches, held at Nice in 325, which also declared the Son to be of equal substance with the Father. With regard to the Holy Spirit, the East and West subsequently divided, the Eastern Church holding procession of the Spirit from the Father through the Son, and the West procession alike from Father and Son. In the Protestant view, Father, Son, and Holy Spirit are equal in power and glory, each having a specific activity, the Father that of creation, the Son that of redemption, and the Spirit that of sanctification.

TRINITY CHURCH. See NEW YORK CITY.

TRINITY COLLEGE. See VERMONT (Education).

TRINITY COLLEGE, HARTFORD. See CONNECTICUT (Education).

TRINITY SUNDAY, the Sunday after Pentecost, or *Whitsunday*, sacred to the celebration of the Trinity, and introduced into the Church calendar by Pope John XXII (1316-1334). It concludes the principal Church festivals of the year, and the succeeding Sundays till Advent are called Sundays after Trinity. The receiving of Holy Communion between the first Sunday of Lent and Trinity Sunday is obligatory on all Roman Catholic communicants.

TRIODE. See RADIO COMMUNICATION (Glossary of Radio Terms).

TRIPARTITE PACT, a co-operative alliance entered into originally by Germany, Italy, and Japan. See the countries named.

TRIPE, a meat consisting of part of the muscular walls of the stomach of sheep or cattle. The flesh from the first stomach is *plain tripe*; that from the mucous membrane constituting the second stomach is *honeycomb tripe*. As ordinarily prepared for market, the meat is cleansed, soaked in limewater, partly cooked, and pickled in vinegar.

E.V.M'C.

TRIP HAMMER, a power hammer used principally in such forgings as do not require the heavy blows of a steam hammer (which see). It is mounted on a pivoted beam, which has an upward-and-downward motion. The hammer is raised by the action of a revolving cylinder with cams, and is released when it has reached the highest point within the range of lift of the cams, falling by its own weight. The stroke of the trip hammer cannot be controlled. When the hammer drops, it does so with full weight. It may, however, be released before it is raised to its extreme height, which lessens the force of the blow.

[A form of speech, commonly heard, refers to *trip-hammer blows*, meaning that the blows are delivered with every ounce of force available.]

TRIPLE ALLIANCE, a name given at various times to a union, by treaty, of three powers of Europe for stated periods of time, to assure protection for each member against outside powers, and to achieve certain specified ends. The first treaty of this kind was signed in 1668 by England, Holland, and Sweden, to prevent Louis XIV of France from taking possession of the Spanish Netherlands (now Belgium). Another alliance, to maintain the Peace of Utrecht, was made in 1717 between Great Britain, France, and Holland.

The Last Triple Alliance. In 1882, Germany, Austria-Hungary, and Italy entered into a triple alliance. The initiative came from Italy, whose leaders hoped, by joining the Central Powers, to strengthen the dynasty against republicanism, to prevent further expansion by France in North Africa, and to guard against

any attempt to restore the temporal power of the pope. Great resentment had been aroused in Italy by the French occupation of Tunis in 1881. Both Germany and Austria-Hungary agreed to come to the assistance of Italy in the event of an unprovoked attack by France, an obligation that Italy likewise assumed in the case of an attack on Germany. The allies also agreed to support each other if attacked by two or more Great Powers. The purely defensive character of the Alliance was modified somewhat in 1887 when Germany agreed to give Italy full support in opposing a French advance in North Africa and when Austria-Hungary admitted the right of Italy to be heard in Balkan affairs. In addition to various military agreements, naval conventions were signed in 1900 and 1913.

The weakness of the Alliance lay in the relations of Italy and Austria-Hungary. The two had never been good friends and Italy coveted the Italian-inhabited provinces of the Dual Monarchy; especially the Trentino, Trieste, and Istria. Irredentism, or the movement to gain these territories, became increasingly strong after 1890. The interests of the two states further conflicted in the Balkans, in the Adriatic, and in the Eastern Mediterranean. The development of Anglo-German rivalry and hostility after 1896 also weakened the position of Italy in the Alliance. At the outbreak of World War I Italy declared its neutrality, insisting that the Alliance was defensive and that there was no obligation to support its allies because the War was the result of an act of aggression by Austria-Hungary against Serbia. The Alliance was not denounced, but was used in an effort to extract concessions from Austria-Hungary for the continuance of a policy of neutrality. As the Dual Monarchy was unwilling to make any considerable concessions Italy entered into alliance with Great Britain, France, and Russia, in April, 1915, and in May denounced the Triple Alliance and declared war on Austria-Hungary. Italy declared war on Germany in August, 1916. See WORLD WAR I; TRIPLE ENTENTE. H.M.E.

TRIPLE DIVIDE MOUNTAIN. See GLACIER NATIONAL PARK (Mountains).

TRIPLE ENTENTE, *ahn tahnt'*, the French term for *triple agreement*. The outbreak of the World War in 1914 found the chief powers in Europe divided into two opposing groups—the Triple Alliance, consisting of Germany, Austria-Hungary, and Italy; and the Triple Entente, composed of England, France, and Russia. Of these latter powers only France and Russia were allied; they were bound together by a military convention concluded in 1892 and a naval agreement signed in 1912. In 1904 France and England made a comprehensive settlement of colonial differences. The Moroccan crisis of 1905 created a close bond

between them, strengthened by their growing hostility to Germany. Between 1906 and 1914 military and naval agreements established at least a moral obligation on England's part to support France in a war with Germany. In 1907 England and Russia came to an agreement about Persia, Afghanistan, and Tibet. In the spring of 1914 a naval accord was discussed. In the beginning the Triple Entente was nothing more than an informal grouping, but between 1912 and 1914 it became an effective diplomatic combination. After the outbreak of World War I closer consolidation was thought necessary. On September 5, 1914, the Entente Powers signed the Declaration of London. They agreed not to conclude a separate peace with the Central Powers. By this act the Triple Entente was transformed into an alliance. See WORLD WAR I; TRIPLE ALLIANCE. H.M.E.

TRIPLET. See MUSIC (Measures and Time).

TRIPLETS. See QUINTUPLETS.

TRIPOLI, *trip' o lih*, the former name of Libia; also, the name of one of its capitals. See LIBIA; BARBARY STATES; WORLD WAR II.

TRIPOLI, a mineral like clay or chalk, composed chiefly of minute shells containing silica, which are so hard that they will scratch glass. Thick deposits of tripoli are sometimes found under peat beds. Powdered tripoli is used for polishing glass, metals, and marbles. It was originally brought from Tripoli in Africa. It is found in France, Italy, Germany, and Nova Scotia, and in several states of the American Union. See RADIOLARIA; SILICA. A.N.W.

TRIPOLITANIA, *tre po le tah' nyah*. See LIBIA.

TRIEME, *tri' reem*, an ancient war vessel, or galley, invented by the Corinthians, and having three banks of oars arranged one above another. The lowest rank of rowers had the shortest oars and the easiest work. A crew might consist of 200 men, including twenty sailors, twenty marines, and the others rowers. The trieme was steered by paddles at the stern, and had sails to use when not in battle. The vessel was of light draught and could easily be hauled on shore, and was quickly and skilfully maneuvered. At Salamis, the great naval battle between the Persians and Greeks, in 480 B.C., the Grecian fleet of 300 ships was nearly all triemes. See GALLEY, and page 7272.

Derivation. The word *trieme* is derived from the Latin *tres*, meaning *three*, and *remus*, meaning *oar*.

TRISTAN AND ISOLDE, *tris' tahn, ees-ol' deh*. See OPERA (Some of the Famous Operas).

TRITON, *tri' tun*, a character in Greek mythology, son of Poseidon (Neptune) and Amphitrite, who lived with his parents in a golden palace at the bottom of the ocean. Ancient poets wrote of tritons as minor sea

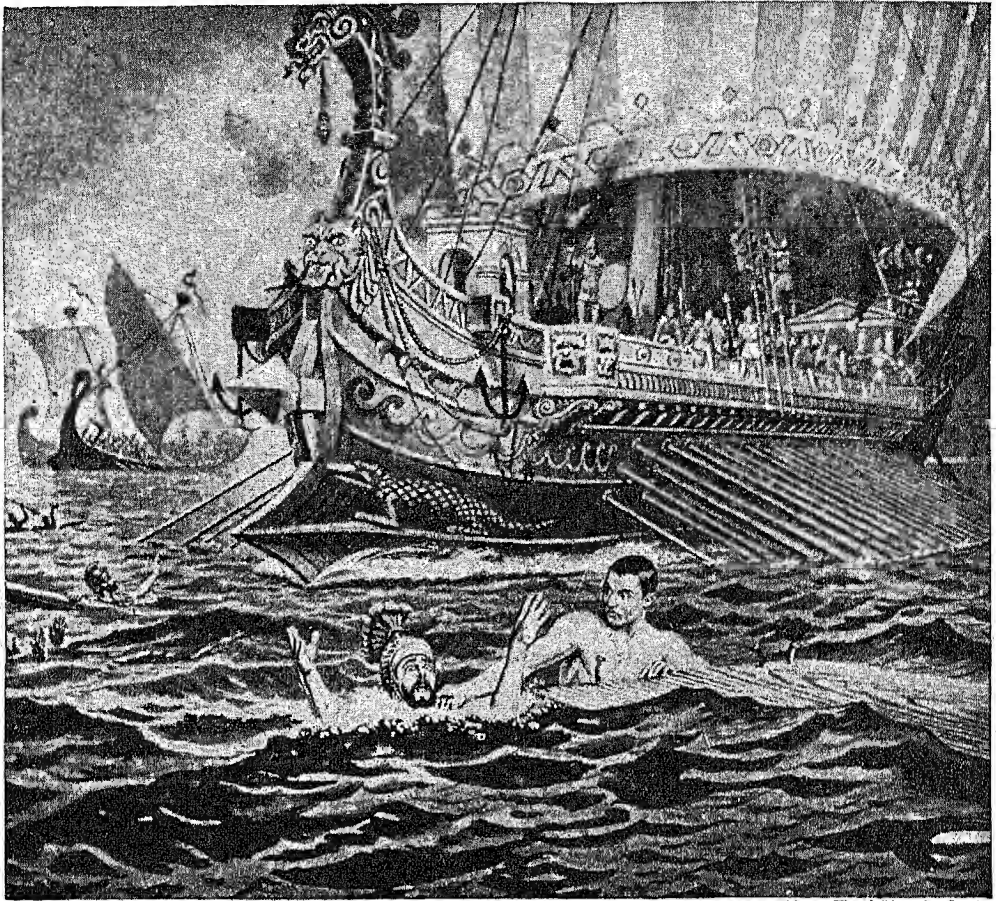


Photo: Visual Education Service

A TRIREME OF OLD ROME

A close view of one of a fleet of war ships engaged in a sea fight. Most vessels of their type were ornamented as lavishly as the one shown above. (See page 7271.)

deities with sea-green hair and eyes, human noses, broad mouths, gills below the ears, scales on their bodies, and dolphins' tails. See NEPTUNE, and illustration, page 2880.

TRIUMPH, *tri' umf*, a word of uncertain origin, but probably derived from the Greek *thriambos*, the name given to a procession in honor of the god Bacchus. In ancient Rome, a triumph was the highest honor that could be bestowed on a general on his return from a successful campaign. The victor entered the city of Rome in a triumphal car drawn by four horses, proceeding along the *Via Sacra* (Sacred Way) to the capitol. He was crowned with laurel and bore a scepter in his left hand, a laurel wreath in his right. The Senate, on foot, headed the procession, with the magistrates, being followed by a large body of trumpeters. A train of carriages laden with spoils of war came next. Oxen to be sacrificed to Jupiter, together with the priests of sacri-

fice, were followed by distinguished captives and inferior prisoners, the latter in chains. The victor, hero of the day, was accompanied by his children and friends, while the rear of the procession was formed by soldiery, who were given license to sing or to jest.

Under the empire, none but the emperor could be given a triumph; successful generals received rewards and decorations only, although a lesser triumph was occasionally given a great general, in which case the victor walked, and was not crowned. This celebration, called an *ovation*, from the Latin *ovis*, the name of the genus to which sheep and goats belong, concluded with the sacrifice of a sheep, instead of a bull or an ox.

A triumph given to a naval commander was very similar to that given a general, but was usually on a smaller scale, and was marked by naval display, prows of ships and other nautical trophies being borne through the streets.

TRIUMPH, ARCH OF. See **ARCH OF TRIUMPH.**

TRIUMVIRATE, *tri um' vih rate*, the term applied in Roman history to a body of three men associated in seizing the government and sharing its rule. The famous First Triumvirate, 60 B.C., composed of Caesar, Pompey, and Crassus, was the first instance of such rule, though it existed without Senatorial sanction. The Second Triumvirate, 43 B.C., was formed under the approval of the Senate by Octavius (Augustus), Lepidus, and Mark Antony.

Related Subjects. Supplementary information concerning these famous triumvirates may be gained from the following articles in these volumes:

Antony, Mark	Lepidus, Marcus
Augustus	Aemilius
Caesar, Caius Julius	Pompey
Crassus, Marcus Licinius	Rome (History)

TROCADÉRO. It was in this building that the American Legion held its annual reunion, in 1927, on the tenth anniversary of the entry of the United States into the World War. See **PARIS (Notable Buildings).**

TROCHAIC, *tro ka' ik*, **METER.** See **METER.**

TROCHELMINTHES, *trok el min' theez*. See **ZOOLOGY (Divisions of the Animal World).**

TROGLODYTES, *trog' lo diles*, a word meaning *cave dwellers*, was applied by the ancient Greeks to a tribe or race who dwelt in caverns or holes which they dug for themselves in the ground. They herded cattle and were hunters and sometimes robbers. We read of them as being employed in the army of Xerxes. They drank a mixture of milk and blood, and they killed the aged when the latter were no longer able to attend to the cattle. Herodotus, Strabo, and Aristotle vouch for their existence.

TROGON, *tro' gahn*, a family of birds found in warm regions in both the eastern and the western hemispheres, noted for their beautiful plumage. They have a peculiar foot structure, as the first and second toes are reversed. The bill is short and strong, the tail usually elongated, and the feet are small and weak. The Old-World trogons feed chiefly on insects; the American species eat fruit, lizards, grasshoppers, ants, beetles, and small crabs. One of the most interesting and brilliantly colored of the group is the Central American *quetzal*. For description and picture of this bird, see **QUETZAL**. D.L.

Classification. Trogons constitute the family *Trogonidae*. There are about fifty species.

TROJAN WAR. See **TROY.**

TROLLEY LINES. See **ELECTRIC RAILWAY.**

TROLLHÄTTAN, *troll het' an*. See **SWEDEN (Rivers and Lakes).**

TROLLING, *troll' ing*, a method of fishing with a moving line and bait, usually drawn

behind a slowly rowed boat. It is a sport dear to the angler who does not care for an easy victory, for the game fish that are caught in this fashion are worthy of any fisherman's mettle. The giant tarpon of the West Indies and the Florida coast, and the savage muskellunge, the undisputed monarch of the northern lakes, are among the chief prizes taken by trolling. In order to make the lure more tempting to the fish, the angler may use what is called a spinning bait, which deceives the fish into believing that it is about to swallow a live morsel. Originally, this was simply the bowl of a teaspoon to which a hook had been soldered; the present spoon hook, however, is a bit of flat, polished metal, which skips and spins along or near the surface of the water. It is made still more irresistible to hungry fish by a gaudy tuft of feathers. Many other artificial lures are available for the fisherman who trolls. The line must be particularly tough and strong for the heavier fish. Trolling from the shore is also sometimes practiced. See **ANGLING.**



THE TROGON

TROLLOPE, *trol' up*, **ANTHONY** (1815-1882), an English writer whose fame rests chiefly on his stories of contemporary English life and manners, which are admirable examples of realistic fiction. Trollope was born in London. He passed an unhappy boyhood and was poorly educated, and when, at nineteen, he entered the postal service, he had given no promise of the unusual literary ability that he later displayed. He began writing fiction in 1847, but it was not until 1855, when *The Warden* was published, that he won recognition

as a novelist of merit. Once launched on his career, he wrote tirelessly, and amassed a fortune before he died. His mother, Frances M. Trollope, was a voluminous writer of novels and travel sketches.

Literary Achievements. Trollope is at his best in his novels portraying the life and characters of English cathedral towns, represented by *The Warden*, *Barchester Towers*, *Doctor Thorne*, *Framley Parsonage*, *The Last Chronicle of Barset*, and others, the whole series being grouped under the title *The Chronicles of Barsetshire*. The reality of his characterizations outweighs the author's obvious faults of triviality and repetition. His other novels, some of them very successful in their day, include *Can You Forgive Her?*, *Phineas Finn*, *The Eustace Diamonds*, *He Knew He Was Right*, and *The American Senator*. Trollope's travel sketches, an estimate of Thackeray, and his biographies of Caesar and Cicero are inferior pieces of writing, but he gives much interesting information in his *Autobiography*.

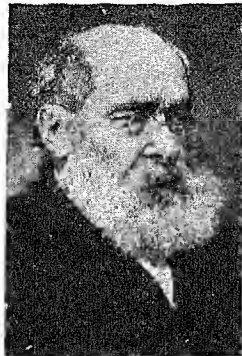


Photo: Brown Bros.

ANTHONY TROLLOPE

TROMBONE, a musical instrument on the order of a trumpet, used in orchestras and military bands because of the volume, depth, and richness of its notes. It consists of a tube twice bent, ending in a trumpet-shaped bell, and sounded by means of a cup-shaped mouthpiece and a slide mechanism. By the manipulation of the slide, the air tube is altered in length and the pitch is accordingly varied from the fundamental. The instrument is at its highest



THE TROMBONE

pitch when the slide is closed. Like the violin, the trombone has a complete chromatic scale. There are four sizes, called *alto*, *tenor*, *bass*, and *contrabass*. The forms usually seen in concert halls are the alto, tenor, and bass, for when played together, these three sound in perfect harmony. In a later type of instrument, there are valves instead of the slide mechanism, but the tones produced are less pure than in the older type.

The dramatic qualities of the trombone have been recognized by the great composers. Warning, wrath, religious exaltation, solemnity, and triumph have all been suggested by the scores for this instrument.

TROMP, MARTIN HARPERTZHOON (1597-1653), a Dutch naval officer, who, during his

career, was victor in more than thirty naval engagements. He was born in Brielle, Holland. His father was captain of a merchantman, and Martin went to sea with him when eight years old. In a fight with an English frigate, the elder Tromp was killed and the boy was taken prisoner on board an English ship. He was subsequently captured by Moslem pirates, but escaped several years later, when he returned to Holland to take service under the Dutch flag.

In 1637 Tromp was made vice admiral. In 1639 he won a brilliant victory over the Spanish fleet off Gravelines and was made admiral.



Photo: Brown Bros.

ADMIRAL TROMP

In 1652, in a war with England, Tromp was victorious against the English commander, Blake. In 1653, after the English had built new and powerful ships the two fleets met again, but the Dutch vessels were no match for the enemy and sought refuge in the Texel. Once more Holland assembled an inferior fleet. Tromp broke the English blockade, but after twenty-four of his ships had deserted, the British won the victory. In this battle Tromp was shot through the heart.

TROPICAL FISH, bright-colored, rapid-breeding fish, commonly found in fresh waters of the tropics. In toy varieties these fish are popular for home aquariums.

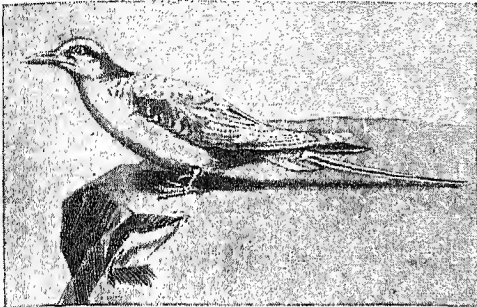
The commonest is the guppy (formerly *Girardinus guppyi*, now called *Lebistes reticulatus*). In its native West Indies and South America where it is very prolific, it devours great numbers of mosquito larvae. The female is about an inch and a half and the male barely an inch long. The female is gray, but the male exhibits such a range of hues as to suggest the rainbow. Guppies are live-bearers and breed at three months, producing from twenty to fifty young alive. Although the guppy can survive temperature of 55° F., water above 68° is desirable.

Tropical fish include the suntails, swordtails, moonfishes, gobies, paradise fishes, gourami, barbels, and many others.

TRONDHEIM, *trahn' ham*, an important seaport of Norway, once called Nidaros. It was one of the key cities in the German occupation of Norway in 1940. See NORWAY (The Cities); WORLD WAR II.

TROPIC BIRD OR BOATSWAIN, *boht'-swayn*, a bird which flies continually over tropic waters, diving perpendicularly for fish, in the

manner of terns, but distinguished from them by its long, willowy, middle tailfeathers. Its plumage is pure white or pinkish in color, and of a remarkably soft, satiny appearance. The best-known species is the *red-billed tropic bird*, which occurs accidentally as far north as Newfoundland. It is pure white, with a coral-red



THE TROPIC BIRD

bill, and is nearly forty inches in length, twenty-six inches being the measure of the tail. Other species are the *yellow-billed* and the *red-tailed*. All tropic birds nest in colonics, making their homes in holes, in crevices in the rocks, or on the bare sand. The one egg is whitish or brownish, mottled with dark brown. Male and female incubate in turn. D.L.

Scientific Names. The tropic birds belong to the family *Phaethontidae*. The red-billed is *Phaethon aethereus*; the yellow-billed *P. flavirostris*; the red-tailed, *P. rubicauda*.

TROPIC OF CANCER. See ZONE; TROPICS.

TROPIC OF CAPRICORN. See ZONE; TROPICS.

TROPICS, in astronomy, two small circles on the celestial sphere, lying parallel with the celestial equator and distant from it twenty-three and one-half degrees each. They mark the seeming limits of the sun's journeys north and south of the equator. The northern one touches the ecliptic at the zodiacal sign Cancer, and is accordingly called the Tropic of Cancer; the southern tropic takes the name Capricorn for a similar reason.

[The term *tropics* is derived from a Greek word meaning a *turning point* or *limit*.]

In Geography. The tropics are the two parallels of latitude which pass through the extreme southerly and northerly points on the earth's surface at which the sun can be seen directly overhead. The tropic north of the equator is the Tropic of Cancer and that south of the equator the Tropic of Capricorn. Each is twenty-three and one-half degrees from the equator. The tropics mark the limits of that zone of the earth's surface which has the highest temperature, with a comparatively small

range of variation throughout the year. This is called the *Torrid Zone*. The regions included in it are usually spoken of as *the tropics*. F.B.L.

Tropical Plants. Plant life in the tropics exhibits a great variety of species and of form. From the majestic palms of the South Seas to the dense jungle growths of tropical Asia, Africa, and South America, there is a vast range of characteristic vegetation, unknown to temperate zones. For scientific purposes, the vegetation of tropical districts has been subdivided into tropical woodland, tropical grassland, and tropical desert, with mangrove swamps in a class by themselves. Tropical woodland, in this classification, includes the vegetation of rain forest, monsoon forest, savanna forest, and thorn forest. Tropical grassland includes savannas and steppes; and tropical desert includes growths of scrub, succulent plants, and perennial herbs. See color plate herewith.

In a tropical rain forest, there is a great diversity of trees, shrubs, and other plant forms, including masses of tangled lianas, or creeping plants, like vines. Many of the trees, including the tallest, bear a wealth of flowers, usually in their leafy crowns, and thus often present a spectacle of highly colored magnificence and beauty. In some tropical forests, there is dense foliage, reaching from the ground to the tree tops, thus darkening the forest and making it almost impenetrable to man, though it usually abounds in animal inmates. In other cases, in the tropics, the rain-forest growths may consist of trees and plants that afford a free passage and a clear view. In the forests of denser growth, where the tropical plants are engaged in a constant struggle for light, one common result is that a large number of air plants (*epiphytes*), including orchids, mosses, and lichens, are found on the high branches of the trees.

In a rain forest, the leaves of the trees are usually evergreen; but in a monsoon forest, or tropical forest in a district with seasonal rainfall, the trees usually lose their foliage during the dry season, and regain it during the rains. Savanna forests and thorn forests occur where the rains are less abundant, and tropical grassland is found where the precipitation is still less. Each type of tropical district has its own plant life, on a descending scale of size and profusion, from the rain forest to the grassland and the desert, the latter being more common in the subtropics.

The palm tree is perhaps the most striking of tropical plants, and its profusion in nature may be judged from the fact that the palm group includes about 150 genera and 1,200 species. Among these are the date palm, coconut palm, oil palm, betel palm, wax palm, rattan palm, palmyra, and various palmetto and cabbage palms—all of which serve to en-

hance the picturesque beauty of the tropics, and to make life therein more endurable for the human race. T.H.R.

Related Subjects. The reader is referred in these volumes to the following articles:

Astronomy	Ecliptic	Zodiac
Cancer	Capricornus	Zone

TROTZKY, *trols' ke*, LEON (1879-1940), whose real name was LEV DAVIDOVICH BRONSTEIN, a Russian Jew who after the revolution of 1917 rose from obscurity to the second most powerful post in Russia.

He was born near Elizavetgrad, and educated at Odessa. Imbued with revolutionary ideas from childhood, before he was twenty years old he was arrested and banished to Siberia. Forging a passport with the fictitious name Trotzky, which he subsequently adopted, he managed to escape to England in 1902. Here he had for companions such zealous revolutionists as Plekhanov and Lenin. The Russian uprising of 1905 found him a prominent member of a Saint Petersburg (now Leningrad) soviet, the entire body of which was arrested; again Trotzky was exiled to Siberia, but as soon as he arrived there, he escaped. For the next few years, he roamed Europe, always an agitator, sometimes finding employment on a revolutionary newspaper. He was outspoken in his disapproval of World War I, and was deported from France and Spain. Finally, he sought refuge in New York City, where he worked on a Russian radical newspaper.



Photo: Brown Bros.

LEON TROTZKY

After the czar's downfall, in 1917, Trotzky hurried to Russia, and allied himself with Nikolai Lenin. In the new Soviet government he was Commissar of Foreign Affairs and later of War. After the death of Lenin, early in 1924, Trotzky contended for power with Stalin, but lost. In 1927 the Soviet rulers expelled him from the Communist party. The following year, he was expelled from Russia and sent to Turkestan, and in 1929 to Constantinople. He was permitted to enter France in 1933, Norway in 1935, and Mexico in 1937. In 1936-1937 a number of former Communists were tried in Moscow, charged with plotting, on orders from Trotzky, against the Soviet Union and Stalin. They were found guilty and most of them were executed. To clear himself, Trotzky in the spring of 1937 arranged in Mexico for an informal court of inquiry. Several Americans

acted as judges and found him not guilty. Unsuccessfully attacked in May, 1940, he was killed by a political assassin three months later.

His Writings. Trotzky wrote a number of books and essays on political and social subjects. His works in English include *Defence of Terrorism*; *Lenin*; *Where Is Britain Going*, *Towards Socialism or Capitalism?*; *The History of the Russian Revolution*; *My Life*; and *The Revolution Betrayed*. A.P.

Related Subjects. The reader is referred to:

Bolsheviks	Russia (History)	Stalin
Communism	Soviet	World War I
Lenin, Nikolai		

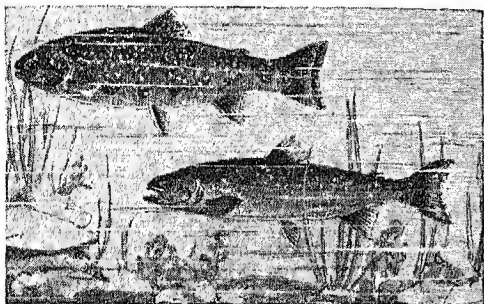
TROUBADOUR, *troo' bah door*, one of a group of lyrical poets who flourished in Southern France between the eleventh and the fourteenth centuries. As composers of charming love poems, expressed in the musical Provençal dialect, they stand out in literary history as interesting figures of the romantic age of chivalry. They idealized beauty, grace, and courtesy, and in their verses lauded the romance of war and adventure, but, more than all, they sang of the beauty of love. There were two classes of troubadours, the professional, who led a wandering life, traveling from court to court and singing their verses to admiring knights and their ladies; and the amateurs, among whom were kings and nobles. Some attached themselves to the households of their feudal lords. Those of the troubadours who could not sing taught their verses to professional musicians called *jongleurs*. Sometimes the jongleurs accompanied the poets and played while the latter sang, and occasionally the jongleur himself was a troubadour. See MINSTREL; FRENCH LITERATURE (Early Stage).

TROUBETZKOY, PRINCESS. See RIVES, AMÉLIE.

TROUT belong to the same family as the salmon, and include many species which are important food and game fish. Nearly all kinds of trout are inhabitants of fresh waters, and they are much sought by anglers who frequent northern lakes and rivers. As a rule, they are gamy and possess voracious appetites. Scientists divide these fish into two main groups, the *black-spotted*, or *true*, *trout*, and the *charrs*. True trout are placed in the same genus as the Atlantic salmon (see SALMON). To the charrs belong the handsomest and most active of the trout species.

Probably the best-known charr is the beautifully colored *brook*, or *speckled trout*. This fish was found originally in the Appalachian regions, westward through the Great Lakes territory to Minnesota, and in the Dominion of Canada from the Saskatchewan River to Labrador, but has been introduced into various lakes and streams of the upper Mississippi Valley and the West. It thrives in cool, clear waters with a gravelly bottom, where the current is strong and there are rapids and deep

pools. The fish spawn in the cold weather of the fall, and the eggs hatch when the temperature of the water has begun to rise in the spring. During the winter, this fish may descend rivers and enter salt water, usually remaining in the mouths of the rivers or in small coastal bays. The brook trout attains a length of a foot and a half in large bodies of water, but fish of this size are becoming rarer all the time, owing to their popularity as game.



TWO SPECIES OF TROUT

Above, brook trout; below, the Dolly Varden.

Anglers speak of their coloring as the "bloom of the trout," for the back is marked with dark olive and black, the sides are spotted with red, and the fins have dark and orange mottlings. The season for angling for brook trout is strictly limited by law.

The native charr of the Pacific-coast waters is the *Dolly Varden*, a fish with a more slender body than the one described above, and with red spots on both the back and the sides. The larger specimens are two or three feet long and weigh from five to twelve pounds. The flesh is delicious, like that of the brook trout, and the Dolly Vardens taken in swiftly flowing, cold streams are game fighters.

The most northern charr, the *Arctic*, is found north of Hudson Bay. It connects an American species, the *sunapee*, with the *European brook trout*, found in cold lakes and mountain streams in the northern part of the continent. The *sunapee* is an inhabitant of Sunapee Lake, N. H., and Flood Pond, Me., two lakes whose waters are very cold and clear. It is noted for its beautiful coloring and active, graceful movements.

The largest species of trout is a coarse charr known as the *Great Lakes trout*. It is found in the Great Lakes and large lakes northward. This trout bears numerous local names. It has small pale-yellow spots all over its body, and weighs fifteen to twenty pounds. Among the Great Lakes fisheries, only those of the white-fish are more valuable commercially than those of the lake trout.

The most important of the true trout are the *cutthroat trout*, the *rainbow trout*, and the

steelhead, or *salmon trout* (see SALMON TROUT). About twenty species of this group are found in the streams or lakes of Western North America. The steelhead is the only one of great commercial importance. L.H.

Scientific Names. The true trout belong to the genus *Salmo*; the Great Lakes trout is included in the genus *Cristiomer*. The other charrs mentioned are species of *Salvelinus*. The speckled trout is *Salvelinus fontinalis*.

TROUT LILY. See DOG-TOOTH VIOLET.

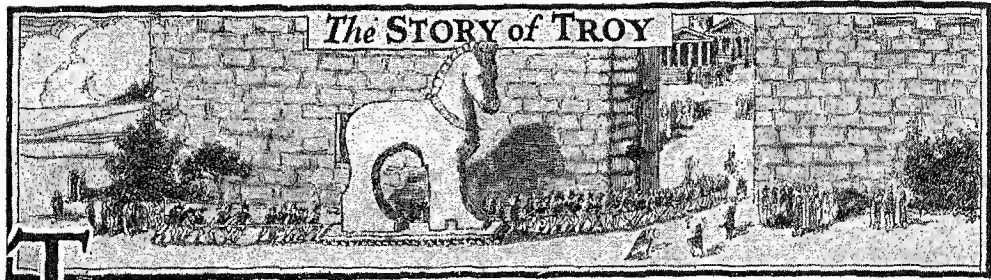
TROUT PERCH, a small fish of North America, one well-known genus being the *sand roller* of the Great Lakes. The form of the body and of the head and mouth are like those of the perch, but the fins are more like those of the salmon. The trout perch is therefore believed by scientists to be a survivor of old forms no longer existing. It belongs to the suborder *Salmopercae*. See TROUT; SALMON.

TROUVÈRES, *troo vair'*, medieval court poets, who were to the north of France what the troubadours were to the southern part of that country (see TROUBADOUR). The name comes from the French word *trouver*, meaning *to find*, or *invent*. These poets invented songs and metrical tales which were sung or recited by others, or by the trouvères themselves. Their poems were principally of an epic character, in contrast to the lyrics of the troubadours. The trouvères, who were often men of high rank or social position, occupied an important place in early French literature, and helped to develop the French characteristics of wit and refinement. See FRENCH LITERATURE (Early Stage).

TROVATORE, *IL*, *tro vah to' ray*, *eel*. See OPERA (Some of the Famous Operas). It was first sung in the United States in 1855.

TROWBRIDGE, *tro' brij*, JOHN TOWNSEND (1827-1916), an American novelist, poet, and writer of stories for boys, was born on a farm near Ogden, N. Y. He obtained a part of his education at a country school, but the larger share of it he acquired through his own efforts. Before he was twenty years old, he taught school for two years in Illinois; then went to New York and later to Boston, to write for newspapers and magazines. He was connected with a number of publications as contributor and editor, and wrote some thirty interesting and wholesome stories for boys, besides other volumes of fiction and poetry.

Representative Works. *My Own Story*, which appeared in 1903, is his autobiography. His first book, *Father Brightshoes*, attracted little attention, but *Neighbor Jackwood*, a story of New England life and a strong protest against slavery, published in 1857, brought him into prominence. His best poems are found in *Vagabonds and Other Poems*. Among his books for boys are *Cudjo's Cave*, *The Jack Hazard Series*, *The Tide Mill Series*, and *The Prize Cup*.



TROY, OR ILIUM, a city of antiquity made famous by the *Iliad* of Homer, one of the greatest literary pieces of all times.

The Trojan War. In his epic, Homer tells of a mighty Troy under King Priam, whose son Paris was chosen as the judge in a beauty contest between three goddesses, Hera, Athena, and Aphrodite. Each goddess offered a bribe, and Aphrodite offered Paris the most beautiful woman in the world. She won. As a result,



OLDEST LEVEL OF ANCIENT TROY

A tower flanking a gateway in the wall of Troy I.

Paris and Troy were hated by the other two goddesses.

Shortly thereafter Paris, a guest at the palace of Menelaus in Sparta, fell violently in love with his host's wife, Helen, most beautiful of women. She returned his love and he abducted her and brought her to Troy.

Menelaus and his brother Agamemnon, Achilles, Ulysses, and a long list of Greek heroes set out for Troy to avenge this wrong. After

Troy had been besieged in vain for ten long years, crafty Ulysses had the Greeks build a huge wooden horse and conceal within it a body of Greek soldiers. The remainder of the Greek army and navy then pretended to sail away. The curious Trojans, despite the warnings of Laocoön, priest of Neptune, dragged the wonderful horse into the city. During the night the soldiers within the horse crept out, opened the city gates to the Greek forces without, massacred its inhabitants, and sacked and burned the city. Only a few heroes escaped, among them Aeneas, hero of Virgil's *Aeneid*.

The Homeric Question. So went the stirring tale of Homer, with truth and fiction deftly interwoven. Even in the ancient classical world scholars concerned themselves about the historicity of Homer and of Troy. Eratosthenes, a famous Hellenistic scholar, dated the fall of Troy early in the twelfth century B.C.

Critics of the eighteenth and nineteenth centuries insisted that Homer never existed and that the poems attributed to him were the composite works of writers and editors of later centuries. Today it is generally believed that the great masterpieces, the *Iliad* and the *Odyssey*, are the production of one great master, Homer.

The Troy of Archaeology. Possibly this change in attitude toward Homer and Troy is in part the result of the remarkable archaeological discoveries made at the site of ancient Troy, the mound which today is called Hissarlik.

Heinrich Schliemann, a practical German business man and a romantic dreamer, was the pioneer archaeologist who began the recovery of the ancient Aegean world. In a skeptical world Schliemann believed that the great Homeric epic was founded on fact. When he had amassed a fortune in the business world, he financed his own expedition to northwestern Asia Minor in search of Homeric Troy.

Others had noticed that the small mound, Hissarlik, about three miles from the Hellespont, the entry to the Black Sea, fitted approximately the requirements of the topography found in the *Iliad*. Here in 1870, Schliemann began to dig. He soon found evidences of one city built upon another. He counted seven distinct settlements.

In the second lowest city, Troy II, Schlie-

mann found evidences of a primitive city, with strong stone fortification walls, well-built houses, pottery, evidences of destruction by fire, and finally a hoarded treasure of gold, silver, and copper materials, including fine jewelry and a variety of cups. Schliemann triumphantly announced to the world that he had found the Troy of Homer and even named his golden objects "Priam's Treasure." Because he had carried off this treasure, Turkey refused him permission to continue excavating.

However, as the recovered materials from the Troy expedition were studied more closely and compared with other Aegean materials, the suspicion grew that Troy II was a city much earlier than the Homeric Age, a city whose destruction probably dated not later than 2000 B.C.

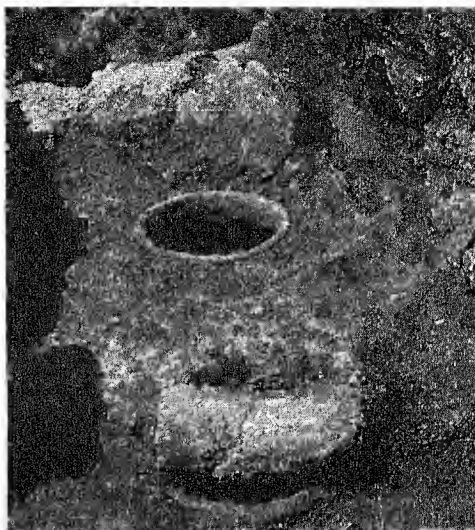
After the death of Schliemann, Wilhelm Dörpfeld, who had worked with the great pioneer, returned to Troy for further excavation. His work in 1893-1894 indicated that there were nine cities on the mound and that Troy II was definitely not the Homeric city. For this honor he chose Troy VI, a strongly fortified city whose remains seemed to be of thirteenth and twelfth century type and whose massive walls had not been discovered by Schliemann.

Then for nearly forty years Troy remained untouched, a period during which much archaeological work was accomplished in the eastern Mediterranean area, in Crete, on the Aegean Islands, and on the Greek and Asiatic mainland. Since large parts of the Troy mound still remained intact, it was thought that a new investigation based on the accumulated knowledge of the past decades might bring new information out of the famous site. And so another expedition came to Troy.

In seven seasons' work (1932-1938), Carl Blegen of the University of Cincinnati checked and excavated the mound of Troy with decid-

edly profitable results. The stratification of the mound was made much more precise and detailed. Many of the nine city levels were subdivided into distinct periods of culture.

Troy I, the oldest level, turned out to be a fortified city apparently guarding the sea route to the Black Sea and not a poor Neolithic

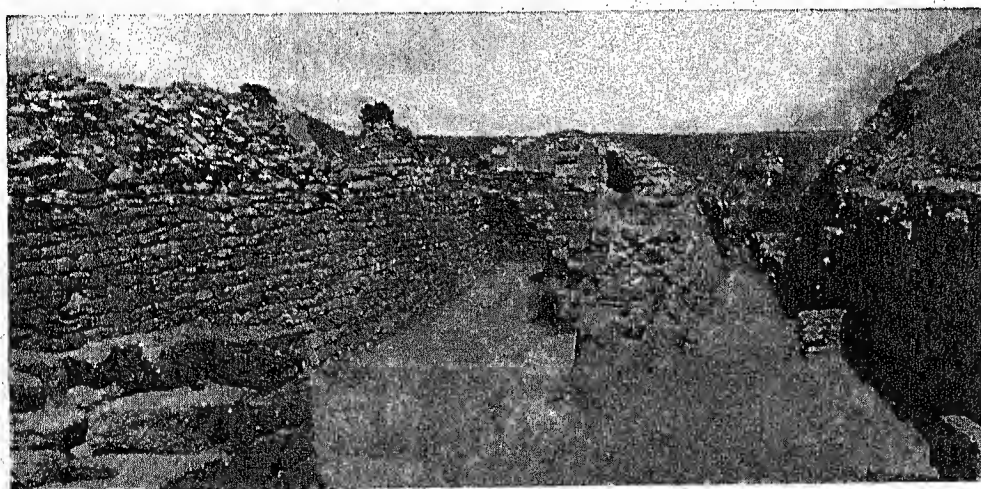


SUNKEN JARS OF ANCIENT TROY

Storage jars set below the floor of a house of Troy VIIa.

village. In levels of Troy II, Blegen uncovered gold objects comparable in style to those found by Schliemann. Troy III and IV actually were not separate cities, but sequences of the same slowly developing culture. Troy V showed distinguishable levels of development within the period.

Troy VI, the city picked by Dörpfeld as the



ON THE LEFT, A FORTIFICATION WALL OF TROY VI



PROBABLY THE TROY OF THE ILLAD

Showing stone walls of a house of Troy VIIa, where much material from the older ruins was used.

Homeric city, was found to be an extensive and important city with splendid fortifications, possibly one of the great trading cities of the world of its day. Shortly before 1300 B.C., an earthquake, not an invader, destroyed this city. This then was not the Homeric city.

The evidences now indicate that Troy VIIa, the next building level, is the city of the *Iliad*. Troy VIIa rose almost immediately on the ruins of Troy VI. Though of poorer and rougher construction than its predecessor and utilizing much material from the older ruins, this Troy was a strong city. But within a century, shortly after 1200 B.C., this city suffered a thorough destruction through fire and pillage. The time of this catastrophe fits most nearly the computed and the traditional date for the sack of Troy. Whether this catastrophe came about through the illicit love of a woman, through trade rivalry, or through the advance of new tribes from Europe, cannot be established.

Out of the blackened ruins of Troy VIIa arose a new settlement, a poor village of mixed racial composition, including some new elements. This is exactly the type of city one would expect to find after a violent destruction such as described by Homer. The last city at the site, dated to about the beginning of the Christian Era, shows Graeco-Roman cultural elements.

All told there are now about forty periods of building activity represented in the fifty feet of occupational deposit which cover approximately three thousand years of history. The Troy which modern archaeology has recovered is truly more remarkable than that of Homer.

W.H.D.

Related Subjects. The reader is referred to:

Achilles	Hector	Odyssey
Aeneas	Helen of Troy	Paris
Aeneid	Iliad	Penelope
Agamemnon	Iphigenia	Priam
Apple of Discord	Juno	Thetis
Eris	Laocoön	Ulysses
Greece	Menelaus	Venus
(page 2940)	Minerva	Wooden Horse

TROY, N. Y., the county seat of Rensselaer County is situated in the central-eastern part of the state, on the east bank of the Hudson River, at the head of tidewater navigation opposite the main outlets of the Barge and Champlain canals (see NEW YORK STATE BARGE CANAL). Albany, the state capital, is six miles south. Population, 70,304 (1940).

The city lies for the most part on a narrow strip of land extending along the river for seven miles, and eastward to hills that rise in some places to a height of about 400 feet. Four bridges connect it with Watervliet, Cohoes, Green Island, and Waterford, on the opposite side of the river. A new concrete bridge to Cohoes, replacing a burned structure, was opened to traffic in 1923. Here was once the oldest covered bridge in America.

A community hotel, erected by the citizens of Troy and called the *Hendrick Hudson*, was opened in 1926, and since that time the city has entertained numerous national gatherings of military, philanthropic, fraternal, and academic organizations, so that it now lays claim to being a "convention city." The close proximity of Albany, the state capital, and of historic points along the Hudson, adds greatly to the attractions of Troy for visitors.

Transportation. Steamers and barges ply regularly between Troy and New York, and there is water communication with the Great Lakes through the Barge Canal, and with Canada through the Champlain Canal. Railway transportation is provided by the New York Central, the Delaware & Hudson, and the Boston & Maine railroads, and interurban and motorbus lines afford passenger and freight service to near-by cities.

Industry. The city of Troy is noted especially for the manufacture of men's linen wear, including shirts, collars, and cuffs. Ninety per cent of the men's collars made in the United States are manufactured in Troy. There are also one of the largest factories in the Union for making mathematical and engineering instruments, and one of the largest valve plants in the United States. Iron and steel castings, centrifugal extractors, fire hydrants, rail joints, and knit goods are also manufactured.

A six-million-dollar coke-oven plant, in which coal tar, ammonium sulphate, and benzol are produced, has helped to make Troy one of the largest iron-manufacturing centers in the eastern states. There are in all over 200 manufacturing concerns, many of which are among the largest of their kind in the country. Among the leading products are abrasives, hydrants, bells, chains, brushes, and automobile parts. At Troy the Federal Government has constructed a dam across the Hudson River, and the water power thereby obtained, with that of the Wynantskill and Poestenkill rivers, each having a fall of about 200 feet, offers special facilities for manufacturing.

Education. In addition to its public-school system, the city has Emma Willard School for Girls. It was established in 1825 as the Troy Female Seminary, and was among the first institutions of its kind in the United States. Rensselaer Polytechnic Institute is a famous school of civil engineering, founded in 1824, and the city has also Russell Sage College for Women.

History. The site of Troy was bought from the Indians in 1659 by Jan Wemp, and passed to Derick Van der Heyden in 1707. It was then known as Van der Heyden's Ferry, and as Ferryhook, until 1789, when the town received its present name. This was adopted in town meeting, after an influx of settlers from New England. The appellation "Uncle Sam" (which see) was first applied to the United States government in Troy during the War of 1812. The collar industry dates from about 1819. Manufacture of cuffs began in 1845. The city was incorporated in 1816, and in 1901 it annexed Lansingburg. G.W.L.

TROYES, an ancient town in France, still flourishing as a textile center. It gave its name to troy weight (which see).

TROYES, *trwah*, PEACE OF. See HENRY (V, England).

TROYON, CONSTANT (1810-1865) French landscapist and animal painter born at Sèvres, began his career as a decorator of china. In 1832 he moved to Paris. One of the most brilliant of the Barbizon group, he first attracted attention with his landscapes. Later he began painting animal pictures, particularly cattle, for which he is most famous. Charac-

terized by their coloring, light and shade, atmospheric effects, impressive aliveness, and the deft integration of landscape and animal subjects, his canvases include *Oxen Going to Work*, *Holland Cattle and Landscape*, *Flock of Sheep*, and *Two Dogs in Leash*.

TROY WEIGHT, a standard system used in weighing gold, silver, platinum, and coins; also jewels, except pearls and diamonds, which are weighed in carats, one carat being equal to 3.17 grains troy. *Troy* is derived from *Troyes*, a French town, which, in the fourteenth century, had its own system of weights and measures. The derivative *troy* was used to designate a system in which the pound contained twelve ounces, the ounce was equal to twenty pennyweights, and the pennyweight equal to twenty-four grains (see table in DENOMINATE NUMBERS). The troy pound and the apothecaries' pound are alike in having 5,760 grains each. The pound avoirdupois is equal to 7,000 grains. The grains in all three systems are equal. See POUND.

TRUCE, FLAG OF. See FLAG (As a Symbol); FLAG OF TRUCE.

TRUCHAS, *troo' chaks*, MOUNT. See NEW MEXICO (The Land).

TRUCKEE RIVER. See TAHOE (lake).

TRUCK FARMING. See VEGETABLES; INTENSIVE FARMING.

TRUE BILL. See JURY AND TRIAL BY JURY.

TRUE BLUE. See BLUE (As an Emblem).

TRUDEAU, EDWARD L. (1848-1915), American physician of French descent, internationally noted authority on pulmonary tuberculosis. A victim of the disease, he pioneered in the fresh-air-rest treatment and founded the famous Adirondack Cottage Sanitarium at Saranac Lake, N. Y., the first of its kind in America.

TRUMBULL, JONATHAN (1710-1785), American patriot born in Lebanon, Conn. He was graduated at Harvard in 1727. A licensed minister, he later became a lawyer and was elected to the general assembly in 1733, becoming speaker six years later. He served as judge of the county court and chief justice of the superior court preceding his fourteen years (1769-1783) as governor of Connecticut colony. Bancroft, the historian, said that he had all the virtues of a rural magistrate. Reputedly, he was the only colonial governor who supported the patriot cause. He took a prominent part in the events leading to the Revolutionary



Photo. Brown Bros.

JONATHAN TRUMBULL

War, and was the chosen friend and counselor of Washington, who placed great confidence in him. The latter is reported to have frequently said, when troubled about some important matter, "Let us hear what Brother Jonathan says," or words to that effect. In time, the phrase "Brother Jonathan" was used as a nickname for the whole people (see BROTHER JONATHAN). In 1872 Trumbull's native state of Connecticut presented his statue to Statuary Hall (which see).

TRUMPET, the most ancient of wind instruments, its known history dating as far back as 2000 B.C. It is of brilliant and penetrating tone, especially adapted to the expression of martial sentiments, songs of triumph, tragedy, vengeance, and other impassioned ideas. Essentially, it is a long, narrow tube, curved back upon itself twice, cylindrical in two-thirds of its length, and conical in the remainder. The various tones are produced by vibration of the player's lips and pressure of the breath. The mouthpiece has the form of a shallow cup, and the other end is a flaring bell. Before the introduction of the modern valve trumpet, the player had to use lengthening pieces to vary the key of the instrument; later, the slide trumpet was used to secure the effect of the chromatic scale. Piston valves, each one of which controls a certain length of tubing, are a part of the mechanism of the trumpet used in modern orchestras and wind bands. Trumpets are made in C, $\flat B$, $\flat E$, and F. The C trumpet produces notes of the actual pitch.

Both the bugle and the trumpet are used to summon soldiers to their duties, and to convey commands of field officers, the trumpet being the special instrument of the cavalry. See BUGLE.

TRUMPET CREEPER. See BIGNONIA.

TRUMPET FLOWER. See BIGNONIA.

TRUST, in economics, means an industrial monopoly. A trust may be said to exist when a person, corporation, or combination owns or controls enough of the plants producing a certain article to be able, for all practical purposes, to fix the price at which it shall be sold. Control over the price is the fundamental test of monopoly. The term trust does not, however, include monopolies in the so-called public-service industries; such as, for example, railroads and telephones. It applies only to monopolies built up by combinations of capital.

Pools. The modern-day trust was preceded by a number of other devices resorted to for the purpose of restraining competition among manufacturers. The first and most common of these devices was the *pool*, an arrangement whereby a number of concerns, each preserving its own organization and, to a large degree, its own independence, adopted measures looking toward the maintenance or raising of the

prices of the articles produced by them, or the depression of the prices of the materials and supplies required by them. The pool in the industrial world may be compared, so far as its organization is concerned, to a League of Nations in the political world. The members of the pool, like the members of the League, retain full control over certain matters, but temporarily delegate certain powers to a central organization. Upon the disbanding of the pool, as upon the dissolution of the League, the members resume complete control over their affairs.

There are various kinds of pools. In some cases, the output is fixed and apportioned among the members. In other cases, there is a division of territory among the members. In still other cases, a central selling agency is created, to make the sales for the members. Though pools are still common in the United States (and even commoner in certain European countries, where they are sanctioned by public policy), they proved to be an unsatisfactory device for restraining competition. They were weak in two respects. In the first place, they were not able to maintain a sufficient degree of stability with respect either to prices or to industrial policy. The individual members of the pool retained a large degree of independence, and their conflicting interests frequently led to the dissolution of the agreement. In the second place, the pools had no legal status; the courts would not lend aid to their enforcement, because they were regarded as contrary to public policy. Accordingly, a new device for restraining competition was employed.

The Voting Trust. The new device was the so-called *voting trust*, from which the modern trust derived its name. Under the voting-trust arrangement, the stockholders of the companies to be brought together assigned their stock to a board of trustees, who voted the stock, and thus controlled the affairs of all the companies. The stockholders, in return for their stock, received trust certificates, which could be transferred like ordinary certificates of stock. The Standard Oil Company employed this arrangement in 1882, and its example was soon imitated by a number of other companies. But these voting trusts, as a device for achieving monopoly, did not last long. The courts soon held that they were unlawful; in the first place, because the parties thereto had delegated their essential corporate powers to an irresponsible board, contrary to the privileges granted to them by their charters; and, in the second place, because the whole arrangement was in effect a partnership of corporations, and for corporations to enter a partnership is unlawful.

Modern Trust. The next device resorted to for the purpose of restraining competition was the modern *trust*. The trust was some-

times effected through the medium of a holding company; that is, a company formed to acquire at least a majority of the voting stock of the concerns to be combined in the trust. The controlled companies maintained their separate existence, and were nominally independent; yet, inasmuch as the holding company elected their directors, it effectively controlled their management, and was able to operate the several properties in accordance with a unified plan. Other trusts took the form of a corporation owning outright the plants and other property of the companies that were united in the trust. The modern trust movement dates from 1898. In that year and the years immediately following, many trusts were formed; in fact, there was a veritable craze to monopolize industry. Prominent among the trusts organized during this period were the Standard Oil Company of New Jersey (1899); the United States Steel Corporation (1901); and the International Harvester Company (1902).

Explanation of the Movement. The primary explanation of the trust movement, notably that characterizing the period from 1898 to 1903, was the desire of the manufacturers to restrict or eliminate competition, and thus to establish monopoly prices. In a sense, the trust movement was a natural development of the factory system. As this system developed, it was found that most commodities could be produced more cheaply on a large scale than on a small scale. This discovery led to the enlargement of operations, which, combined with improved means of transportation and communication, brought factories actively into competition with one another. But production on a large scale involved large investments of capital which could not easily be withdrawn. Competition was therefore at times very severe, to the detriment of profits. Combination, resulting in the elimination of competition, seemed to offer a way out of the difficulty. Accordingly, many trusts (industrial monopolies) were formed, and prices were advanced to a monopolistic level.

A secondary influence was the hope of achieving the economies of the trust form of organization. It is generally recognized that competition is wasteful in many particulars; and it was believed that the trust, having a monopoly, would be able to effect many savings that were not available to concerns engaged in active competition with one another. This matter is discussed below at more length. A third influence was the lure of large profits for the trust promoters, men who conceived the idea of a trust in a given industry, or, if they did not conceive it, at least carried it through to a successful consummation. The promoters of the United States Steel Corporation, for example, realized a profit of \$62,500,000. This

was an unusual case, of course, but there can be no doubt that the prospect of securing promotion profits did contribute markedly toward the formation of numerous trusts.

Advantages. At the time when trusts were being created in large numbers, much was said about the economies that would be realized. The promoters naturally wished to secure public approval of a movement that, on its face, seemed to be fraught with danger to the people; accordingly, they laid great emphasis upon the wasteful character of competition and the savings in cost that were to be effected under the new order. The alleged advantages were numerous—much too numerous to chronicle fully. They may be grouped under three heads: economies in selling; economies in production; and economies in bargaining.

It was alleged that a trust could conduct the sale of products at a lower cost and to greater advantage. Advertising expenditures could be curtailed, traveling salesmen dispensed with, the export trade developed with greater success, and cross freights saved, through the filling of orders from the particular plant of the trust that was nearest to the consumer. It was maintained, secondly, that a trust could effect a reduction in the cost of production. Gains were to be realized through the more continuous operation of plants, the greater utilization of by-products, the specialization of ability, the specialization of plants and machinery, the employment in each plant of the best devices, including patents, and competition between the plants of the trust, this competition taking the place of the former competition between individual producers. It was claimed, thirdly, that the trust could effect certain savings through its superior bargaining power, notably in its relations with the producers of materials and supplies, the distributors of its products, and its employees.

Some of the defenders of the trusts were sincere in their support of monopoly as a more effective economic agent. Some of the economies above set forth were realized in a number of instances. But that the case for the trust was much overstated is made clear by the subsequent history of the trusts. Many of them succumbed to the new competition that sprang up in the years that followed, and eventually lost all semblance of monopoly control. Others made good profits, but found themselves unable to maintain their monopolistic position. Still others not only made excellent profits, but retained their monopoly. At the present time, though large-scale production is making further progress, and combinations are being formed from time to time, there are by no means as many trusts in the country as there were a generation ago. This leads us to a consideration of the disadvantages of the trust.

Disadvantages. The fact that many trusts, notwithstanding the economies that they were able to realize, lost their monopolistic position in the industry, justifies the conclusion that there are certain factors that act as an offset to the economies, and that tend to make the trust an actually less efficient business unit, particularly when viewed over a long period of time. These countervailing factors may be classed under five heads:

(1) The failure to secure the high order of administrative ability that is required to manage a business of the dimensions and ramifications of the trust. This failure may have been due to the scarcity of such individuals, to their unwillingness to serve as salaried officials, or to errors in judgment on the part of those responsible for their selection.

(2) The failure of the trust to enlist the best services of its leading officials. These men had frequently been the managers of independent undertakings prior to the formation of the trust, but once the trust was formed, they became salaried employees.

(3) The tendency of monopoly toward stagnation. The trust, having a monopoly, is perhaps less likely to apply new inventions or to adopt improvements that necessitate the scrapping of expensive plants and equipment.

(4) The additional financial outlays to which trusts are subjected, including an elaborate and expensive system of control and supervision, the purchase of antiquated and inefficient plants in order to stave off competition, and the purchase of aggressive and successful competitors.

(5) The burden of a highly centralized administrative machinery that deadens the enthusiasm and initiative of the subordinate officials.

Trust Legislation. The legislative policy of the United States is based on a conviction that trusts are bad. The Federal government and most of the states have laws forbidding monopolistic combinations of capital. The first Federal law was the Sherman Anti-Trust Act, passed in 1890. This act forbade every contract, combination in the form of trust or otherwise, and conspiracy in restraint of interstate or foreign commerce; and every monopoly or attempt to monopolize.

During the first decade following the passage of this act, very few suits were brought under it, mainly because of the lukewarm attitude of the Attorney-Generals of the United States who were charged with its enforcement. But the formation of many trusts in the period following 1898 changed the situation. During the administrations of Roosevelt, Taft, and Wilson, numerous proceedings were instituted, attacking the legality of practically all the leading trusts and combinations. A number of trusts were found by the courts to be illegal, and their dissolution was ordered. Among these were the Standard Oil Company (1911) and the American Tobacco Company (1911). Other trusts did not permit the proceedings against them to come to a conclusion, but consented to a decree forbidding them to do certain

things that the government regarded as objectionable. Though certain trusts still remain intact, industry at the present time is not under the control of industrial monopolies to the extent that it was before the Sherman Act was actively invoked against offenders.

The Sherman Act was supplemented in 1914 by two other legislative measures. The first created a Federal Trade Commission, of five members, with power to conduct investigations and to issue orders forbidding the employment of unfair methods of competition in commerce (for further details, see **FEDERAL TRADE COMMISSION**). The second (the Clayton Act) dealt with local price discrimination, tying contracts, holding companies, and interlocking directorates, the purpose of this act being to reinforce, by specific prohibitions, the provisions of the earlier legislation intended to preserve competition in industry.

Of recent years the conviction has become widespread that competition, especially if unrestrained, works badly. It may result in price wars, low wages, and an inferior quality of goods. A considerable amount of governmental control is thus required, even in competitive business, but the anti-trust laws cannot safely be repealed.

E.J.

TRUST COMPANY. See **BANKS AND BANKING** (Trust Companies).

TRUSTEE, *trustee*, a person or a corporation to whom the management of property is legally committed. A trust may be created by will, by deed, or by oral statement, but trusts affecting real estate must be in writing. One named as trustee may decline to accept, but once having undertaken a trust, he cannot release himself unless the deed contains a provision enabling him to do so, or a competent court grants such discharge, or permission is given by all persons interested. A trustee must keep account of all moneys, collect debts, keep funds properly invested, and render an account at stated times to the beneficiaries, or those for whom he is acting. He also is liable for consequences arising from his violation of orders of the court, or wrongful uses of trust funds; misappropriation of funds is punishable as one of the statutory forms of embezzlement. Trust companies and banks, as well as individuals, may act as trustees of estates.

In England the office of public trustee was created by act of Parliament in 1906. This officer, under the act, is a "corporation sole," with perpetual succession. He may, if he thinks fit, act as the administrator of estates of small value, as a custodian trustee or as an ordinary trustee; and the law of trusts generally is applicable to him.

Village Trustees. An incorporated village has its legislative department, called *board of trustees*, comparable to the city council, common council, or board of aldermen of a city, or to the legislature (or general

assembly) of a state. This board consists usually of six members, elected for terms of two or three years; the local laws enacted by them are called *ordinances*.

TRUSTIES. See PRISON (Prison Reform).

TRYPANOSOMES, *trip' ah no soh-mz*. See ZOÖLOGY (How Zoölogy Affects Human Welfare); TSETSE FLY.

TRYPANOSOMIASIS, *trip ah no so mi' ah-sis*, the technical name for African sleeping sickness. See SLEEPING SICKNESS.

TRYPARSAMIDE, *trip ahr' sah mide*, a remedy for sleeping sickness (which see).

TRYPSIN, *trip' sin*. See PEPTONES; PANCREATIN.

TSANA OR TANA, a lake in Italian East Africa. See AFRICA (Rivers and Lakes).

TSANPO, *isahng po'*, RIVER, the name by which the Brahmaputra River is known in Tibet (which see).

"TSAR KOLOKOL," the largest bell in the world. See BELL (Famous Bells).

TSCHAIKOVSKY, *chi kawf' ske*, or **TCHAIKOVSKY**, PETER ILICH (1840-1893), one of the greatest Russian composers, born at Votkinsk, in the Ural district. He was educated for the profession of law, and was employed for a time in the Department of Justice in Saint Petersburg (now Leningrad), but developed a fine, strong love of music, and in 1862 entered the newly established Conservatory of Music at Saint Petersburg. Here he studied under Zarembo and Anton Rubinstein, who encouraged him to take up music as a career. Tschaikevsky was appointed professor of harmony at the Moscow Conservatory in 1866, and during the next ten years he labored diligently as teacher, composer, and musical critic. His first compositions received little favor, and a brief, unhappy marriage, contracted in 1877, further discouraged him to such an extent that he attempted suicide in an icy river, but was nursed back to health by his brother. A friend, Nadejda von Meck, was of great spiritual and financial aid to him.

After a period of relaxation in travel, by the end of the 1870's he completed his opera *Eugene Onegin*. About the same time, his *Concerto in B Flat Minor* was played in Berlin and New York, and won high praise. Tschaikevsky lived mostly in retirement thereafter, though he continued to compose and produce symphonies and operas up to the year of his

death, when the famous *Pathetic* symphony, his sixth, was first performed. From 1887 he made concert tours to Berlin, Paris, and London. In 1891 he visited the United States, and at the dedication of Carnegie Hall, New York, conducted some of his own compositions. His reception everywhere outside of Russia was enthusiastic. He died of cholera in Saint Petersburg, at the age of fifty-three, shortly after the production of the *Pathetic* symphony.

Summary of His Work. The melancholy of Tschaikevsky's nature is often reflected in his compositions, which show great originality and are at times highly emotional. Russian phrases and melodies occur over and over again, and his work (especially the contrast of tone colors) is distinctly Slavic, tragedy being predominant. His compositions include symphonies, concertos, operas, orchestral fantasies, overtures, ballets, piano pieces, vocal duets, and exquisite songs. Of outstanding merit are his fantasies—*Manfred*, *Roméo and Juliet*, *The Tempest*, and *Francesca da Rimini*. His *Fifth*, *Fourth*, and *Sixth* (the *Pathetic*) symphonies are among the greatest of that form of music. The delightful *Nutcracker* suite, and the overture *The Year 1812*, are popular. A.P.

TSETSE, *tsel' se*, **FLY**, a two-winged fly that transmits the animal parasites which cause African sleeping sickness. There are several varieties of this disease, each produced by a particular species of parasite, but the parasitic organisms, called *trypanosomes*, all belong to the same genus. There are about twenty species of tsetse fly, some of which, however, do not attack man. These flies somewhat resemble house flies, but are a little larger, and they fold their wings over their backs in such a way that the ends do not project, as do those of house flies. The tsetse fly is equipped with a long proboscis, which it uses to pierce the skin of its victim. The flies suck the blood of mammals, including wild game, cattle, horses, and man, and they transmit to cattle and horses a deadly disease called *magana*. This disease and sleeping sickness are spread in much the same manner as malaria. The insect bites an infected animal or person, and transmits the germs by biting an uninfected victim. The germs do not become infective until they reach the salivary glands of the flies, but the hosts are capable of transmitting the parasites for at least ninety-six days.

The future settlement of large sections of tropical Africa depends upon the outcome of the campaigns being waged against the fly and the disease (see SLEEPING SICKNESS, for information regarding control of the disease). Fortunately, the female insect does not lay eggs, and the flies breed slowly, producing one larva at a time. The larva is deposited on the ground, where it speedily conceals itself in some shady place and turns to a pupa. Both sexes are active bloodsuckers. The species that is chiefly injurious to man lives along lake shores or riverbanks where there is a dense

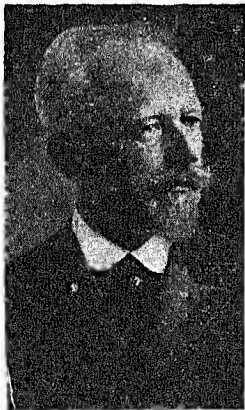


Photo: Brown Bros.

TSCHAIKOVSKY

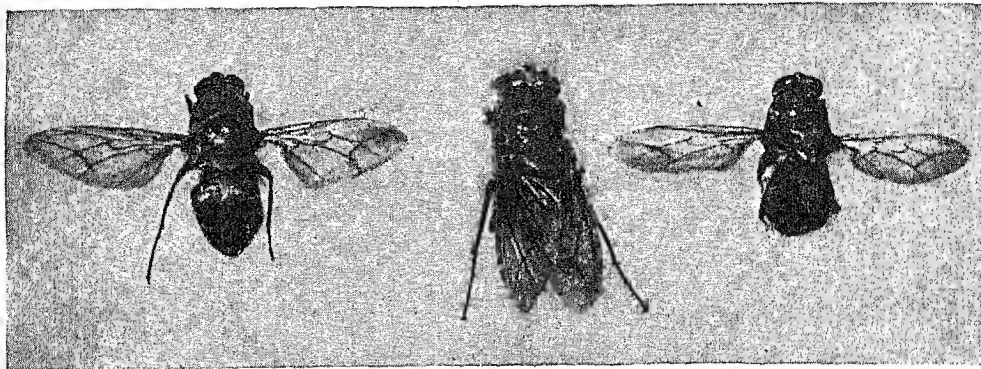


Photo: U & U

THREE VIEWS OF THE TSETSE FLY

forest growth and underbrush. In the Lake Tanganyika district, efforts are being made to kill the pupating larvae by burning grass and brush. In some regions, dummy animals are used as decoys, and black boys are hired to kill the flies, which are sluggish insects. Killing off the wild animals which harbor the germs, and draining the swamps and marshes where the flies breed, have been considered, but it is hardly practicable to carry out these plans on a large scale.

An international commission of scientists, organized through the recommendation of the League of Nations, made a study of the problem.

W.J.S.

Classification. Tsetse flies belong to the fly family *Muscidae*. *Glossina palpalis* is the species chiefly responsible for the spread of sleeping sickness, while *Glossina morsitans* is responsible for the Rhodesian forms of that disease, and is also the principal carrier

of the germ that causes the *nagana* disease among domestic animals.

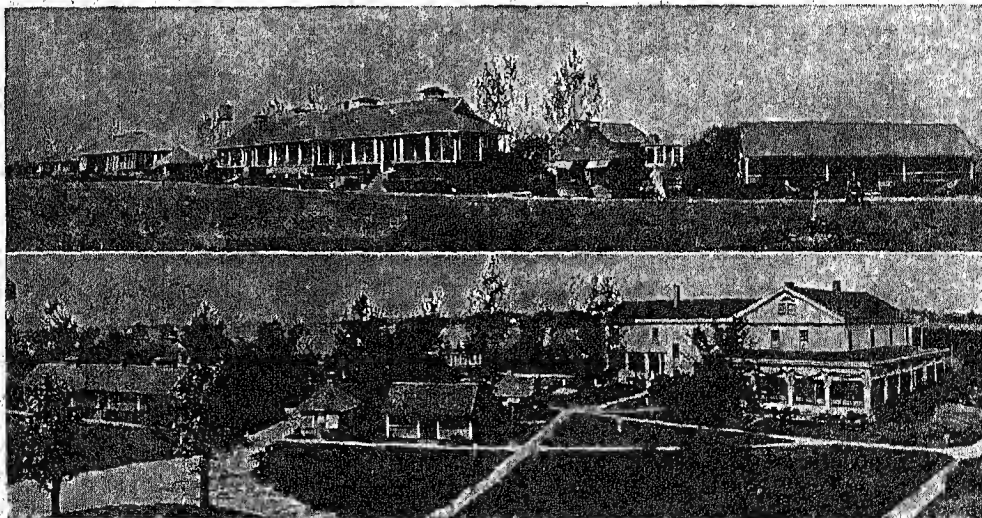
TSINAN, *tsih nahn'*. See SHANTUNG.

TUAREGS, *twah' regz*. See BERBERS.

TUBE. See SUBWAY.

TUBER. See BULB.

TUBERCULOSIS, *tu bur ku lo' sis*, **PHTHISIS**, *thi' sis*, OR **CONSUMPTION**, an infectious disease, sometimes called the *white plague* because of its prevalence and virulence. It causes about one-tenth of the deaths in the human family. The disease occurs in several forms, but the one in which the lungs are affected is the most common. No age, race, or sex is immune from tuberculosis attacks, and its ravages are so serious that, in several countries, associations for the study and prevention of the disease have been formed. On the other hand, there has been a steady decline in the death rate in various parts of the world for



Photos: U & U

FIGHTING THE "WHITE PLAGUE"

There are many sanitariums such as the above that are maintained to treat by the most modern methods those who have become afflicted with tuberculosis. This one is at Naperville, Ill., a suburb of Chicago.

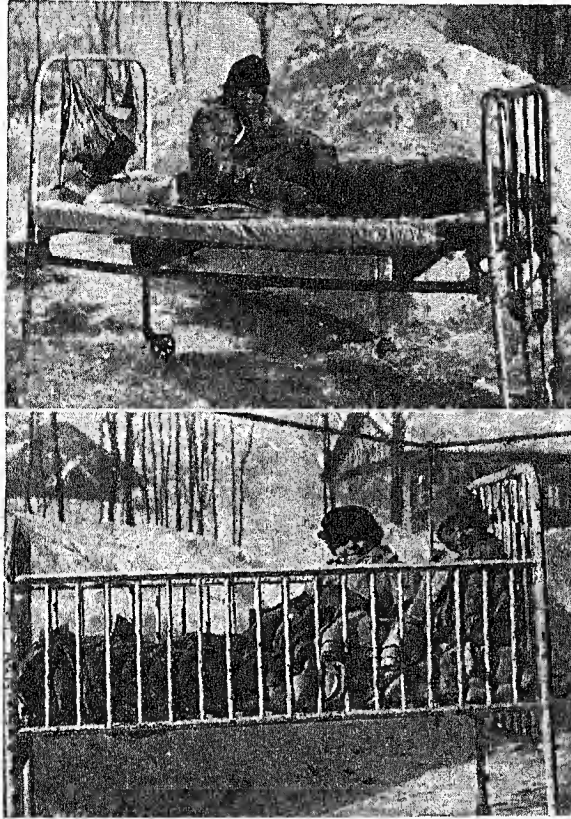
nearly a century. It is generally agreed that the falling death rate within more recent years is due in considerable degree to modern methods of prevention and control, based on newer knowledge concerning tuberculosis and its cause. It is also an accepted theory that the human race has gradually been building up a resistance to the disease through a process of natural immunization. The people who harbor the germs of tuberculosis are much more numerous than those that acquire the disease. Mild and repeated infections, not developing virulently, would tend to create immunity. These statements, however, are not meant to undervalue the importance of modern preventive measures. The application of these, aided by immunization, inspires hopes that, within the present century, tuberculosis will cease to be an important factor in human mortality.

Cause. Tuberculosis is caused by a specific microorganism isolated in 1882 by the famous German bacteriologist, Dr. Robert Koch. It is a minute, rodlike parasite of vegetable origin, $\frac{1}{8000}$ of an inch in length. Besides the human variety of bacillus (see page 566), there are other types designated as *cattle*, or *bovine*, and *bird*, or *avian*. Children are especially susceptible to the invasion of the bovine tubercle bacillus. The carrier in such cases is milk from tubercular cows, but it is safe to drink milk that is pasteurized. The bacilli multiply with great rapidity in the tissues they invade, causing the formation of groups of cells called *tubercles*. In resistant subjects, a hard tissue forms around the germs, rendering them inactive. In persons who suffer both infection and disease, the

tubercles rapidly disintegrate into the characteristic ulcers and cavities of tuberculosis.

Transmission. Lung (pulmonary) tuberculosis is by far the most prevalent type of the disease, and the usual source of infection is the sputum of actively sick persons. Countless tubercle bacilli are contained in the sputum and are ejected through coughing, sneezing,

and spitting. When dried and carried through the air as dust, or in the form of minute drops, sputum is an important germ-carrier, especially in homes, conveyances, public halls, and other enclosures. Out-of-door dust is less dangerous, because sunlight is a destroyer of the bacteria. Sputum deposited on handkerchiefs, clothing, towels, furniture, carpets, and other objects is what sanitarians call "dangerous dirt." Carelessness in this respect has caused many a small child, playing about a room, to become infected, though the infection may not develop actively until years later. A great many cases of tuberculosis in adulthood are the result of infection in childhood. There is also some transmission through contaminated food and water. Milk as



Photos: U & U

THERE IS HOPE FOR THESE YOUNGSTERS

The three children shown above have tubercular bones. In addition to danger to life, there is a possibility that one leg or arm will become shorter than the other. To prevent such developments, weights are attached to the limb which appears to be shortening. The constant pull tends to maintain proper length. Note the weights over the foot of the bed in the upper illustration.

a carrier has already been mentioned (see MILK).

Whether the bacilli enter the body by way of the mouth or nose, focal areas are established, possibly in the tonsils or the larynx, and from these poison centers the germs are carried in the blood circulation to sites of infection, notably the lungs. The larynx often becomes infected from the lungs. When the tubercle bacillus attacks the skin, finding entrance through a cut or scratch, the disease is known as *lupus*. *Scrofula* is tuberculosis of the lymph glands.

Symptoms and Control of Lung Tuberculosis. This disease has two principal forms—acute and chronic. The acute variety is called quick, or galloping, consumption. An attack begins suddenly with chills, fever, rapid pulse, pain in the chest, cough, labored breathing, and lung congestion. These symptoms increase in severity, and death ends the attack in from four to twelve weeks. There is no cure. Chronic tuberculosis is the type that affects by far the greater number of tubercular persons. This form begins with a dry cough, slight rise of temperature toward evening, declining appetite, and a feeling of lassitude. If the disease is not checked, the cough becomes chronic and very annoying, and a yellowish or whitish sputum is raised. This is sometimes colored with blood. Other symptoms are night sweating, pain in the lungs, constant fever, which is especially high late in the day, and emaciation. Sometimes, quantities of blood are raised from the lungs during a spell of coughing. Death may occur unexpectedly from hemorrhage or exhaustion.

Though no specific has as yet been discovered for the cure of tuberculosis of the lungs, much can be done through treatment along hygienic lines. Many cures have been effected by removal of the patient to a dry, bracing climate, where the temperature is even and sunny days are numerous. Much emphasis is placed by modern authorities on the value of sleeping and living in the open, and of eating nourishing food. The ideal place for a tubercular victim is a sanitarium in a healthful locality. In all cases, the earlier the diagnosis and start of treatment, the better are the chances for recovery.

Prevention. The problem of prevention involves several factors. One of these is early diagnosis, which not only helps the patient, but enables him to keep from infecting others. Thorough physical examination in suspected cases, especially where there is constant fatigue, is important. A valuable aid in establishing the diagnosis is the tuberculin test. A very small dose of tuberculin is injected into the skin, and in tuberculous patients there is a definite reaction within a few hours, manifested by rise in temperature, rapid pulse, chills, and other characteristic symptoms. Persons not tuberculous experience little or no discomfort. Discovery and arrest of tuberculosis before it reaches the open stage, in which sputum is emitted, may prevent any number of infections.

In case of persons actively sick, sanitary disposal of the sputum is all-important, and so, too, is scrupulous care on the part of every patient. All objects which the patient uses or with which he comes in contact should be disinfected, boiled, or destroyed. A tuberculous person should have separate toilet and table articles, and should sleep alone. Especial

care should be taken to prevent the uncontrolled exposure of children. No child should live in the same rooms with an open case of tuberculosis. All milk consumed by children should be pasteurized. All milk products should be made from pasteurized milk. All milk used should be from cows proved free from tuberculosis by the tuberculin test. Children should be especially protected against those dusts which contribute to consumption. These are dust from houses occupied by consumptives, metal dusts, sand dusts, and dusts from granite and sandstone. While adults are greatly endangered by exposure to these dusts, they are even more harmful to children.

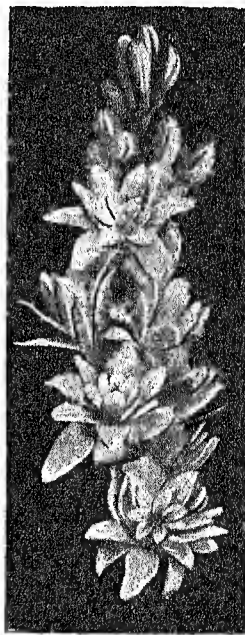
These measures help to prevent the spread of actual disease. There is another line of prevention which emphasizes the importance of building resistance. In the article *LIFE EXTENSION*, in these volumes, the reader will find many valuable suggestions on the upbuilding of a healthful, germ-resistant body. W.A.E.

Related Subjects. The reader is also referred in these volumes to the following articles:

Bacteria and	Lupus
Bacteriology	Sanitary Science
Disease	(with list)
Health Habits	Scrofula

TUBEROSE, *tube' roze*, a garden or hot-house plant of the amaryllis family, which has

been described as "a lump of cloying sweetness." It is not related to the rose, but is allied to the Mexican agaves, the name being a corruption of the adjective *tuberous*. At one time, the flower was extremely fashionable, but because of its heavy, almost sickening fragrance, it is now less frequently used. The slender stem, often three feet in height, springs from a tuberous rootstock, and bears clusters of funnel-shaped, waxy-white blossoms at the top, and, at the base, six or eight sword-shaped leaves. A native of tropical America and Asia, the flower is now cultivated extensively in France, Italy, and Switzerland, at the Cape of Good Hope, and in North Carolina and New Jersey, for perfumes and toilet preparations. In the factories



DOUBLE PEARL TUBEROSE

at Grasse, France, 80,000 pounds of tuberoses are used annually for this purpose. B.M.D.

Scientific Name. The tuberose belongs to the family *Amaryllidaceae*. Its botanical name is *Polianthes tuberosa*.

TUCSON, *loo sahn'*, ARIZ. See ARIZONA (back of state map).

TUCUMAN, *loo koo mahn'*, a city in Argentina. See ARGENTINA (The Cities).

TUDOR, the family name of an English royal house, or dynasty, whose reign, extending from 1485 to 1603, was a period of almost absolute royal authority. Most of the feudal nobility had been destroyed during the Wars of the Roses, but after the union of the two opposing royal houses by the marriage of Henry VII, head of the Lancastrian house, to Elizabeth, the daughter of Edward IV and heiress of the House of York, the great body of the people were glad to have peace at whatever sacrifice. Thus the king ruled with an iron hand, forcing all factions to obey a common central law, and a greater national unity was established than had existed for many years, continuing down through Elizabeth's reign. On the death of Elizabeth, the succession passed to James VI of Scotland, first of the House of Stuart, who reigned as James I. The following table gives the dates of the reign of each of the Tudor sovereigns:

HENRY VII married <i>Elizabeth</i> , daughter of <i>Edward IV</i> , thus uniting the Houses of Lancaster and York 1485-1509		
HENRY VIII 1509-1547		
EDWARD VI 1547-1553	MARY 1553-1558	ELIZABETH 1558-1603

Related Subjects. The reader is referred in these volumes to the following articles:

Edward (VI)	James (I)
Elizabeth	Mary (I)
England (The Religious Struggle)	Plantagenet Roses, Wars of the
Henry (VII and VIII)	Stuart, House of
Lancaster, House of	York, House of

TUDOR STYLE, that style of English architecture which prevailed during the period of the Tudor sovereigns, between 1485 and 1603. It was a late phase of the so-called Perpendicular style, a form of Gothic which was characterized by straight lines. During the reign of Henry VIII, the mansions of the gentry and nobility were built on a quadrangular plan, with an inner and a base court and a gatehouse between them. Turrets, decorative chimneys, and bay and oriel windows were popular. Late in the period, the Elizabethan phase of the Tudor style developed; some of the country homes built at this time may still be seen in

England. Characteristics of the Elizabethan style are great square windows, numerous fireplaces and chimneys, carved wooden staircases, gables, eight-sided turrets, projecting bay windows, paneled ceilings, and detailed ornamentation. R.N.

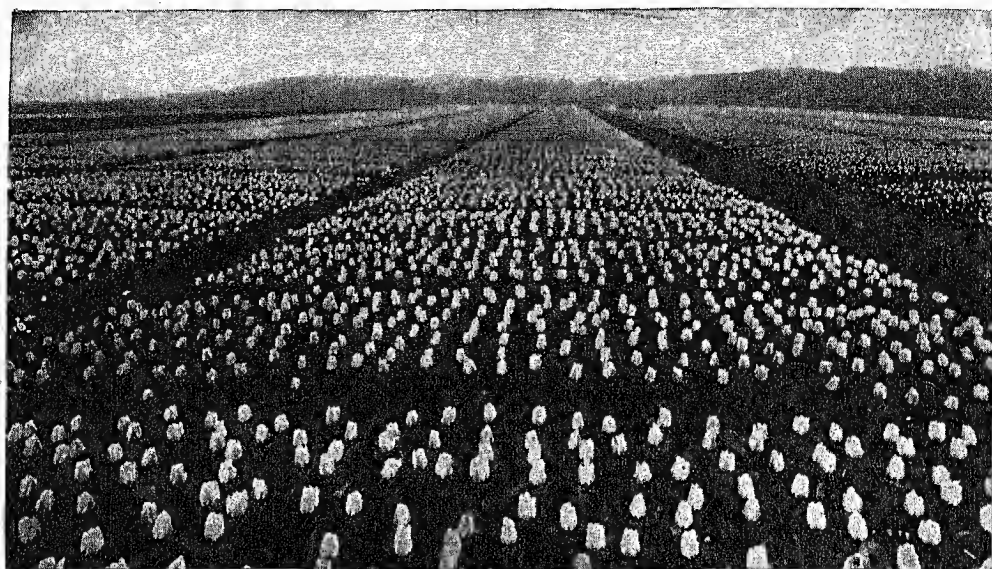
TUESDAY, the name of the third day of the week, is derived from *Tiu*, or *Tiw*, Anglo-Saxon form of *Tyr*, name of the Norse god of war. He was the son of Odin, or Wodin, to whom the day of Wednesday was sacred. The French name for Tuesday is *Mardi*, derived from *Mars*, name of the Roman war god. In the Church calendar, *Shrove Tuesday* (which see) is the Tuesday before Lent. It was so called because confessions were made especially on that day, and the priest *shrived*, or *shrove*, the penitent; that is, gave him absolution. The custom continues in the Catholic Church to this day. See WEEK.

TUFA, *loo' fah*, a porous rock formed by the waters of mineral springs. These waters hold carbonate of lime in solution and deposit these substances on evaporation, forming *calcareous tufa*. Tufa is a coarse rock with a cellular structure, and often contains twigs, leaves, or mosses, around which it has formed. The name is also incorrectly applied to dust, ash, or sand thrown out by volcanoes and compacted into rock, which is more correctly called *tuff*. A.J.

TUGALOO RIVER. See SAVANNAH RIVER.

TUILERIES, *tweel' re*, or *twe' lur iz*, a famous royal palace, which stood on the right bank of the Seine, in Paris. It was named from the tile works that had formerly occupied the site. In 1565 Catharine de' Medici began the building, which was originally a great circular structure, surmounted by a dome. Later rulers of France made alterations in the plan, changing the central pavilion to a square, and adding north and south wings and a gallery which connected the palace with the Louvre. Few events of historic importance took place in the Tuileries before 1789, when Louis XVI and his family were forced by the Revolutionary mob to take up their residence there instead of at Versailles. It was there that the Swiss Guards were slain three years later, and there the Convention for a time held its sessions. It was the home of Napoleon, and continued to be the royal residence after the Restoration. In 1871 the palace was almost entirely destroyed by the Communists, but the garden of the Tuileries (about seventy-five acres) is still a favorite pleasure resort. See PARIS. R.N.

TULANE, *tu layn'*, **UNIVERSITY OF LOUISIANA**, THE, one of the largest institutions of higher education in the South. It is located in New Orleans. The organization evolved from the Medical College of Louisiana, one of the first medical schools of the country, established in 1834. Out of the medical school



developed the University of Louisiana, chartered in 1845. The present Tulane University dates from 1882, when Paul Tulane, a merchant of New Orleans, donated the first installment of a \$1,050,000 gift, to be used to strengthen the existing university.

In 1884 the name Tulane University of Louisiana was adopted, and a contract was made between the state and the administrators, whereby the Tulane Educational Fund would be used to support the university. Later, a gift of \$100,000 from Mrs. Josephine L. Newcomb, increased by her will to \$3,000,000, established the H. Sophie Newcomb Memorial College for women. Among other departments of the university are the colleges of arts and sciences, law, commerce and business administration, social work, engineering, and medicine. The Middle American Research Institute deals with the history and natural resources of Mexico and Central America. The faculty numbers about 600; the student enrollment is nearly 5,000. J.H.R.F.

TULAREMIA, an infectious disease caused by *bacterium tularensis*, commonly contracted through a skin abrasion while dressing infected rabbits, hence called "rabbit fever." It is also transmitted by deer and horse flies and various



Photos: O.R.C., Visual Education Service

A TULIP FIELD

Heralds of Easter and approaching spring-time wave their heads in the wind. Tulip fields are a glory of Holland, colored in pink, blue, lilac, white, and yellow, the whole resembling some rich Oriental carpet. Below, the form of the flower.

Tulips grow from bulbs. The leaves spring directly from the bulb, and the flower stems, which are from three inches to over two feet in height, end usually in a single, large, bell-shaped flower, though sometimes there are two, three, or four in a cluster. The flowers are single or double, and usually grow erect on the stem. Their coloring is infinitely varied; some blossoms are of a single color, some have combinations of rose shades, some have gorgeous parrot hues. See color plate, facing 4005.

ticks. Other animals that may be infected include squirrels, sheep, and quail. The mortality rate for man is about 5 per cent.

TULIP. Of all garden flowers, none are more colorful and graceful than the tulips. Their charm is enhanced, too, by the fact that they bloom in the spring, ahead of nearly all the other cultivated flowers.

Tulips constitute a genus of the lily family. There are about forty-five species, most of them being native to Southern Europe and to the warm regions of Asia. Nearly all cultivated varieties are derived from a species, native to Asia Minor, that was brought to Vienna from Constantinople in the sixteenth century. The very name is of Turkish origin, and means *turban*.



Photos: Visual Education Service

THE TULIP TREE

At left, the appearance of the blossoms; at right, the form of the tree.

Tulip plants are usually grown from bulbs planted in autumn for spring blooming. They require a well-drained, loamy soil of average richness. As a rule, only professional growers or experimenters grow tulips from seed, as it takes from three to seven years to obtain a flowering bulb, and after a few seasons, the blossoms tend to change materially in color.

After the introduction of the tulip into Europe, it became the flower of fashion both in England and in Holland. In the latter country, between 1634 and 1637, interest in the new plant developed into a craze. Individual bulbs sold for fabulous prices; many persons were financially ruined by wild speculation, and the government was compelled to intervene. To-day, tulip cultivation in Holland is an important industry, and millions of bulbs are exported annually, nearly 2,000 varieties being produced by the Dutch growers. Recently, a large number of new species were discovered in Turkestan and introduced into Europe, and tulips of all kinds are now more extensively grown than ever, both in Europe and in America. B.M.D.

Scientific Name. Tulips belong to the family *Liliaceae*. The species introduced into Europe from Constantinople is *Tulipa gesneriana*.

TULIP TREE, a North American forest tree of the magnolia family, so called because its flowers resemble the tulip. It is found from the New England states west to Wisconsin and south to Florida and Louisiana. The tulip tree attains a height of 80 to 200 feet and a diameter of five to ten feet, and is loved for its shade and its beauty. It bears showy, yellow flowers, each petal marked with a spot of orange, which attracts the bees; and it has smooth, dark-green leaves that turn yellow

in the autumn. The wood, which is easily worked, is used in making boats, shingles, brooms, and wood pulp, and interior finish for houses. *Yellow poplar*, *tulipwood*, and *whitewood* are various names applied to the timber. From the bark, which has a bitter taste, a tonic drug is prepared. G.M.S.

Scientific Name. The tulip tree belongs to the family *Magnoliaceae*. Its botanical name is *Liriodendron tulipifera*.

TULLIUS. See **SERVIVS TULLIVS**.

TULLUS HOSTILIUS. See **ROME** (The Period of Legend).

TULSA, OKLA., the county seat of Tulsa County, is situated in the northeastern part of the state, on the Arkansas River, 250 miles northwest of Little Rock, 120 miles northeast of Oklahoma City, the state capital, and 218 miles by airline southwest of Kansas City. It has been called "the oil capital of the world," on account of its importance in the oil industry, which has caused its rapid growth from a population of 1,390 in 1900, to 72,075 in 1920 and to 142,157 in 1940. Tulsa has a diversity of enterprises, interests, and resources.

The city occupies an area of twenty-two square miles, at a point where the old boundaries of the Creek, the Cherokee, and the Osage nations met. An ancient elm, which was the council tree of the Creeks, still stands in Tulsa. In a park of 2,300 acres of timbered land, Mohawk Reservoir, a 1,160,000,000-gallon reserve for the city's water system, also serves to supply lagoons, lakes, and water courses, which make the great recreation ground especially attractive. The water supply comes from a point in the Ozark mountains, sixty miles east, by means of an aqueduct and by force of gravity alone. This is noteworthy

in view of the fact that there is a difference of only ninety feet between the elevation of the reservoir at the source in the hills and the terminus in Tulsa (see *AQUEDUCT*). The International Petroleum Exposition is held every two years in the city.

Transportation. Tulsa is served by five railroads—three major and two secondary roads, three air lines, four transcontinental bus lines, and it is located on four federal highways.

Industry. Tulsa is located in a region well adapted to stock raising and agriculture, especially to the growing of truck crops and grain, but its prosperity is chiefly the result of its proximity to natural gas, coal, and oil fields. Practically all of the oil and gas companies operating in the mid-continent field have headquarters in the city. Natural gas is largely used in manufacture, which is represented by plants for making oil well supplies, glass factories, and steel mills. The city also has smelters and refineries. The oil fields in the Tulsa area produce one sixth of the world's supply of crude oil.

Education. In addition to its modern public school system, Tulsa is the seat of the University of Tulsa, a non-political, non-sectarian, privately endowed institution; and many types of private educational institutions.

History. For so large a city, Tulsa's history has been remarkably brief, placing it in a class with Gary, Ind., and other so-called "mushroom" cities of North America that are now on a substantial basis of commercial prosperity. White settlement began in 1882, when an extension of the Frisco line was completed to the old Indian trading post. Up to 1900 the settlement grew slowly and was generally known as "Tulsey town." Oil developments began in 1901, and in 1902 Tulsa was chartered as a city. Eight years later there were 18,182 inhabitants, and between 1910 and 1920 the population was quadrupled. Its later growth is noted above. The city adopted a commission form of government in 1908, and a city plan and regional plan are also in effect.

A.J.B.

TUMACACORI, *too mah kah' ko re*, **MONUMENT.** See **MONUMENTS**, **NATIONAL.**

TUMBLEBUG. See **SCARAB.**

TUMBLEWEED, the popular name of various annual plants found in prairie regions. They are so called because they develop rounded tops and in the autumn, when withered, are carried or *tumbled* about by the wind, like great, light balls. As they scatter their seeds about in their travels over the plains, they are considered a pest by farmers and ranchmen. Often they pile up against barbed-wire fences or fill small gullies, and they become a menace in case of prairie fires, as the wind blows them across the prairies in a burning trail. Among the common American tumbleweeds are the so-called *Russian thistle* (*Salsola pestifera*) and a species of the amaranth family. See **THISTLE**.

B.M.D.

TUMOR, *tu' mur*, an abnormal growth or swelling of an area of tissue in the body or on the skin. As the term is commonly used, it is applied to harmless or curable growths, called *benign*, and to *malignant* growths, which are dangerous and tend to return after removal. Generally speaking, a malignant tumor is a cancer. Benign tumors may be as harmless as a wen on the body, or as serious as a fibroid tumor in the uterus. There are many kinds of tumors. As a rule, the name of a tumor is determined by the kind of tissue it is composed of, whether connective tissue, muscle tissue, nerve tissue, vascular tissue, or epithelial tissue. See **CANCER**.

W.A.E.

TUNA, an alternative for *tunny* (which see).

TUNDRA, the name, first applied by the Russians, for the extensive, low-lying, frozen swampy plains of Siberia, Europe, and North America, bordering on the Arctic Ocean. The surface is covered with a dense growth of peat moss, which grows only during the summer months. Only the surface layer thaws out during the short summer. See **ALASKA** (Animal and Plant Life).

R.H.W.

TUNG OIL is extracted from nuts produced by the tung tree, a native to the Orient, particularly China. The most powerful drying agent known, tung oil is used extensively for printing ink, waterproofing fabrics and paper, as an insulating compound, and for high durable finishing products such as varnish, lacquer, and enamel. The tung tree, introduced into the United States in the early twentieth century, is grown in the Gulf states. The annual production of tung oil is about 5,000,000 lbs.

TUNGSTEN, a hard, brittle, rare metallic element, of great commercial importance. Its chemical symbol is *W*, from *wolfram*, another name for the metal. Among the pure metals, only iridium and molybdenum exceed tungsten in hardness. When added to steel, it gives greater hardness, tenacity, tensile strength, and elasticity; tungsten-steel tools have about five times the efficiency of those made from ordinary steel. Tungsten has the highest melting point of all the metals, 6143° F. (see **MELTING POINT**), a property that makes it invaluable for use as filament wire in incandescent lamps. It is replacing the more expensive platinum for contact points in spark coils, telegraph keys, automobile vibrators, and similar devices, and is serviceable in the manufacture of X-ray and wireless apparatus. Tungsten compounds are also important. These have a varied use in the manufacture of automobile parts, fireproof cloth, pigments, mordants for use in dyeing and printing, X-ray screens, electric-light bulbs, cutlery, fountain-pen points, dental and surgical instruments. Tungsten steels are used in making gun linings and armor-piercing shells. High-speed cutting tools are made from tungsten carbides.

Tungsten is not found native, and occurs in only a few rare minerals, but these are in sufficient quantities to supply the demand. Wolframite is an ore of iron, manganese, and tungsten; scheelite, of calcium and tungsten; wolfram ocher is the trioxide. California has the largest scheelite deposits known. This ore was named for K. W. Scheele, who in 1781 showed that this mineral contained a peculiar acid, which he named *tungstic acid*. Heating the acid with carbon, two years later, he produced metallic tungsten for the first time. The chief tungsten-producing countries are China, Burma, the United States, Portugal, Bolivia, Argentina, and Australia. T.B.J.

TUNGSTEN LAMP. See **ELECTRIC LIGHT**.

TUNGURAGUA, *toong goo rah' gwah*. See **ANDES** (Volcanoes and Earthquakes).

TUNGUSK, *toon goosk'*, a large coal region in Siberia. See **SIBERIA** (Minerals and Mining).

TUNIC, *tu' nik*, from the Latin *tunica*, a word having several applications, but most closely associated with the dress of the ancient

Tunic, or *tunicle*, is also the name applied to a vestment worn in the Roman Catholic and in some Anglican churches by the subdeacon who officiates at the celebration of the Mass. The term is used somewhat locally to designate the uniform coat of a private in the British army. At the present time, any loose, short garment, fastened at the waist by a belt or girdle and reaching from the neck to some distance above the knee, is called a tunic.

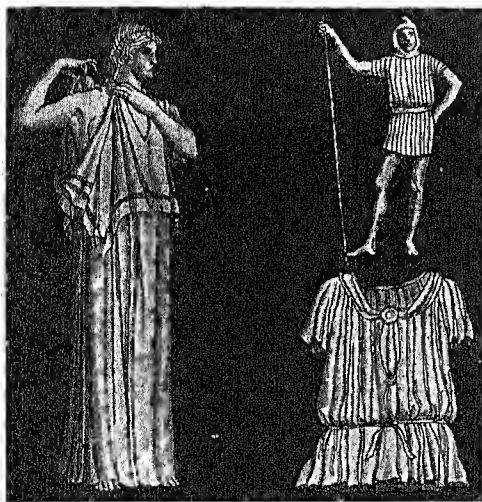
TUNICLE. See **TUNIC**.

TUNING. See **RADIO COMMUNICATION** (Glossary of Radio Terms).

TUNING FORK, a steel instrument having two prongs which, when set in vibration, give forth a musical sound varying in pitch according to the thickness of the steel, the length of the prongs, or their distance apart. The ordinary tuning fork sounds only one note, usually middle C or the A above it; the fork which produces the latter note is usually taken as the musical standard, but some are made with a slide on each prong, which, when moved up or down, regulates the pitch of the note produced. The latter are of German construction. Tuning forks may be made for all musical pitches in the audible range, and they are sometimes mounted upon hollow boxes, to increase the volume of sound by resonance. A light blow will set them in momentary vibration. The device was invented in 1711 by John Shore, sergeant trumpeter to George I of England.

TUNIS, *tu' nis*, capital city of Tunisia (which see).

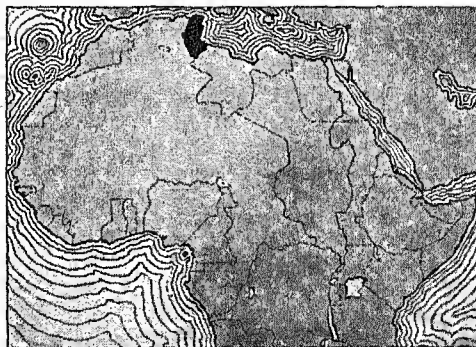
TUNISIA, *tu nish' ih ah*, or *tu nish' ah*, one of the old Barbary states, formerly known as Tunis. Since 1883, it has been under the control of France, having the form of government



THE TUNIC

At left, the Doric tunic; at right, above, the Etruscan; below, the Phrygian.

Romans. The Latin tunic was an undergarment worn by both men and women, and was fastened about the waist by a belt or girdle. It was covered by the toga, when worn by men, and by the stola, when worn by women. The tunic of the Romans corresponded to the chiton of the Greeks. Roman senators wore a tunic having two broad stripes of purple down the center (*latus clavus*), while the tunic of the knights had two narrow stripes (*angustus clavus*). Generals celebrating a triumph and magistrates presiding at the games were dressed in the purple toga and a rich and showy gold-embroidered tunic (*tunica palmata*). See **TOGA**; **STOLA**.



LOCATION MAP

This little country, bordering the Mediterranean Sea, is a very small part of the continent of Africa but is growing in importance. See **AFRICA**, for political map.

known as a protectorate. It lies on the Mediterranean coast of Africa, reaching to the most northerly point on the continent. Algeria is on the west; on the south are Libia (Tripoli)



A STREET SCENE IN TUNIS

Photo: P & A

and the wastes of the Sahara. Tunisia has an area of about 48,300 square miles, approximately that of the state of Louisiana; its native Mohammedan population, mostly Berber mixed with Arab, was 2,395,108 at the 1936 census; there were 59,485 Jews, and the Europeans numbered 213,205; of these, the Italians and French each numbered nearly half. There are also a few Spaniards and Greeks.

The native government is unopposed by the French in most legal matters, but the highest administrative authority is the French Foreign Office, which has a special department for Tunisian affairs. There is a French Minister Resident-General, and a joint ministry of Tunisians and Frenchmen. The present reigning family has occupied the throne continuously since 1705. The chief of the native state is known as the sultan; the reigning sultan signed the agreement in 1883 that placed the country under the protection of France.

The northern half of the country is a plateau, and the southern half is a continuation of the Sahara. The plateau region contains the principal river, the Mejerda, and is the chief agricultural district; the southern part is a treeless plain, covered with esparto grass, except in the oases, where there are many date palms.

The fertile area of Tunis has been well developed. About 1,650,000 acres are devoted to wheat; and nearly as many to barley; and there is also a profitable yield of oats. There are many oases and gardens in the south, where over 80,-

000,000 pounds of dates are produced yearly, and about 60,000 tons of olive oil are exported from nearly 16,000,000 trees. Other products include almonds, oranges, lemons, henna, and cork.

Stock raising and mining are other industries of considerable importance. The production of phosphates is increasing every year, and lead, zinc, and iron are also mined in profitable quantities. The coast fisheries employ about 11,000 of the natives, and others engaged in fishing, spinning and weaving wool, carpet-weaving, saddle-making, and in the manufacture of matting, slippers, and pottery. The country has over 1,200 miles of railway.

Because of its strategic location, air and naval craft based in Tunisia can command the sea lanes of the central Mediterranean. After occupying Algeria and Morocco in November, 1942, British and American forces entered Tunisia. They fought fiercely for its possession, as the ports of Tunis and Bizerte would make excellent springboards for the invasion of Europe. The campaign ended in May, 1943, with the surrender of Axis troops cornered on the Cap Bon Peninsula.

Tunis, *tu' nis*, the capital city, is situated about three miles from old Carthage. It is itself an ancient town, and replaced Carthage politically after the Punic Wars. The city is on the Lake of Tunis from which runs a channel to the Mediterranean. It fell to the Allies in May, 1943. Population, 219,578 (1936).

Bizerte, a naval port situated on an enclosed arm of the Mediterranean Sea, has a fine natural harbor. Its strong strategic position and mountain fortifications

have made it a great naval base. It was captured by the Allies in May, 1943. Population, 28,468 (1936).

Other Towns include Sfax (43,333), Sousse (28,465), and Kairwan (22,991), Gabes (18,611), all occupied by Allied forces by April, 1943. See WORLD WAR II.

Related Subjects. The reader is referred to:

Barbary States	Date and the Date Palm
Bedouins	Punic Wars
Carthage	Sahara

TUNKERS. See BRETHREN, CHURCH OF THE.
TUNKHANNOCK VIADUCT. See RAILROAD; BRIDGE (illustration, page 952).

TUNNAGE. See TARIFF.

TUNNEL, *tun' el*, an underground passage, piercing mountains or hills, or passing under the beds of rivers, and made without removing the overlying rock or soil. Engineers once avoided the construction of tunnels because of the expense, but of late years many difficult tunneling feats have been undertaken, in order to straighten railway lines and to lessen running time. Tunnels are considered by engineers as of two kinds—those driven through rock and those excavated in soft earth. Rock offers a tough resistance to tunneling, but it has the advantage of requiring usually no support to the top and sides of the bore. The rock is drilled to form pockets, in which are placed charges of high explosive, which is then discharged by means of an electric spark. The shattered fragments of stone are removed as the work progresses. Four of the greatest tunnels in the world, the Alpine tunnels of Mont Cenis, Saint Gotthard, Arlberg, and Simplon, were blasted or drilled out of solid rock. The work on the Mont Cenis occupied fourteen years. When a tunnel is driven through soft earth or under the mud of a river bed, it is necessary to support the soil above to prevent caving. This is accomplished by supporting the roof of earth with a sheath of timbers or steel, about which cement is poured and allowed to harden. Most tunnels of this kind have a permanent lining.

In the construction of underwater tunnels, the most serious difficulty to be overcome is the inflow of water. Only in cases where the tunnel lies far beneath the bed of the stream is this not a serious problem for the engineer. The situation is met by the use of the compressed-air or the shield system; sometimes the two are used in combination. By the compressed-air method, the pressure of the inflowing water is checked by compressing the air in the end of the tunnel where the work is proceeding. The other system takes its name from the ingenious mechanical device used in the operations. The tunnel shield is a cylinder of steel plate, with the front fashioned to form

a sharp edge. Hydraulic jacks are attached to the inside surface of the cylinder. Their piston rods, as power is applied, press against the lining of the tunnel already completed, and push the cutting edge of the cylinder into the earth yet to be excavated. Near the front of the cylinder is a partition with openings, which the operators may close at will. As the cylinder is forced ahead, the earth is withdrawn in small amounts through the openings. At the rear end, new lining for the tunnel is constructed with each forward movement of the front edge.

In another method of river tunneling, several cylindrical steel sections are first made and sunk in position in the river bed. These are then fastened together, and enclosed and lined with concrete. The subway tunnels laid under the Harlem River for the New York subway were constructed in this manner.

In the course of time, many tunnels are constructed by natural forces. Thus rivers find a course underground; the action of the sea tunnels caves on the coast to an enormous extent; and phenomena such as the Mammoth Cave of Kentucky are due to natural tunneling.

Tunnels have been proposed for undersea connection between England and France, be-

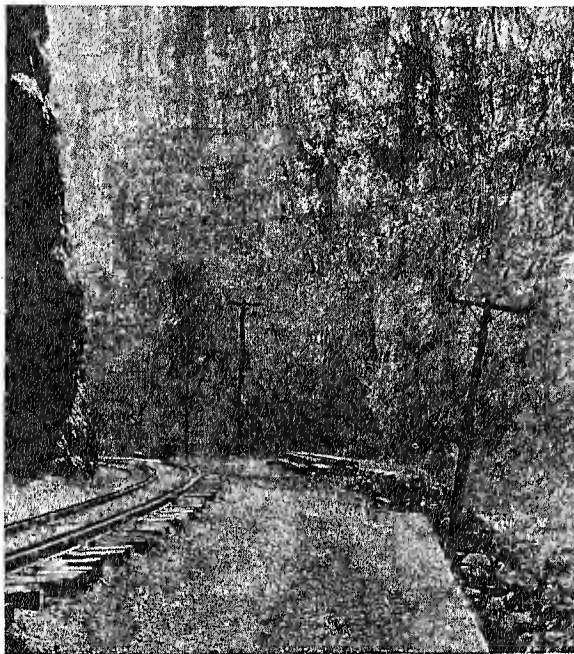
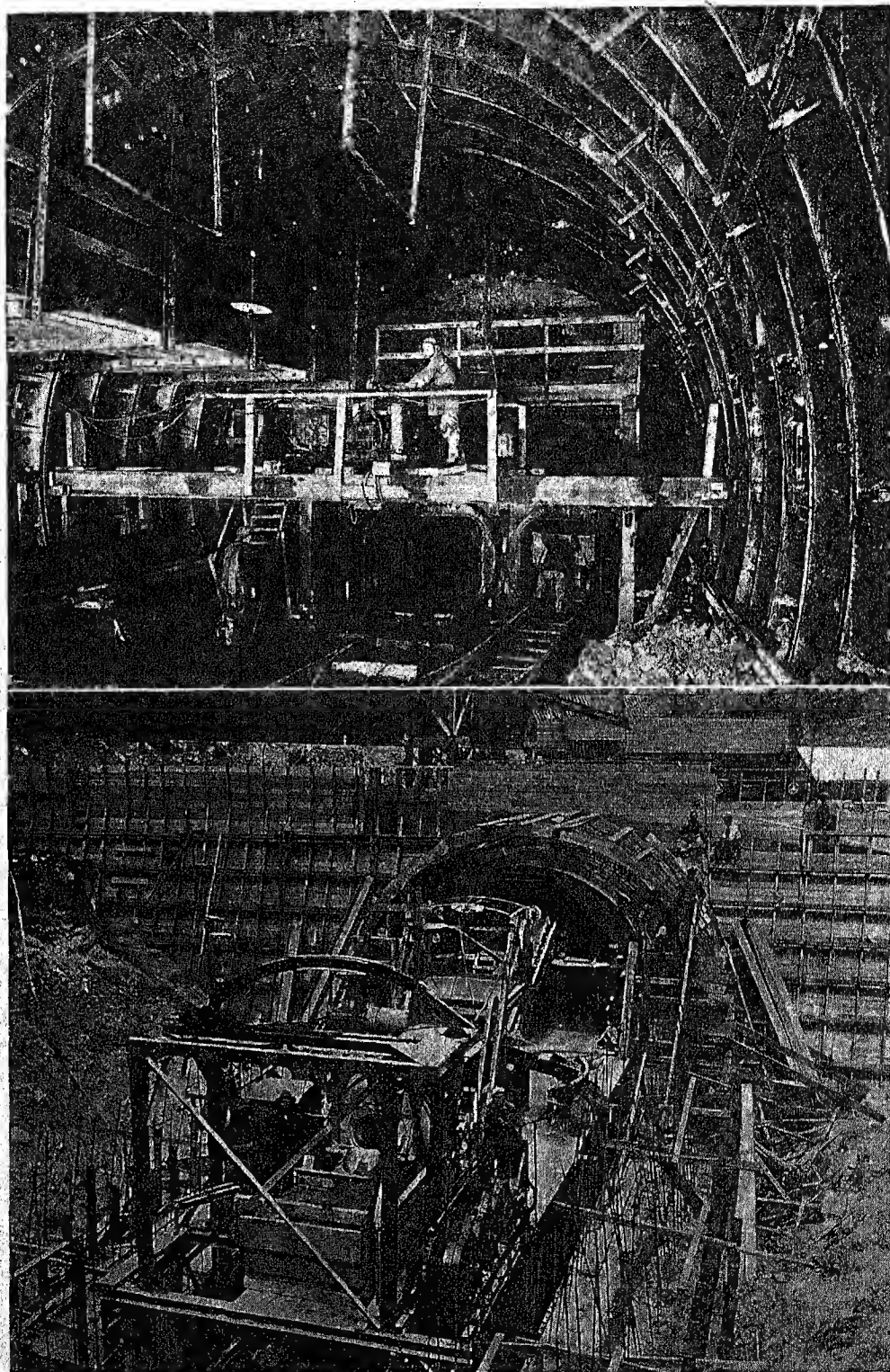


Photo. U & U

THE NATURAL TUNNEL OF VIRGINIA

In the southwestern part of the state, nineteen miles from Gate City, is this impressive natural tunnel, 900 feet long and 400 feet high. One of the entrances is shown in the illustration.



Photos: U & U

Man-Made Tunnels. Through the bases of great mountains and under broad rivers, engineers push highways that are the shortest distances between two points. The illustrations show tunnels under construction. Above, the Hudson River Vehicular Tunnel; below, entrance to the great bore of the Cascade Tunnel.

neath the Strait of Dover; between the Spanish coast and Northern Africa, beneath the entrance of the Mediterranean at Gibraltar; and even to connect Alaska and Siberia, beneath the icy waters of Bering Strait. Military considerations of national defense have always arisen to block such projects.

Under Chicago's downtown streets are sixty miles of freight tunnels. See pages 1352-1353.

The Cascade Tunnel. See CASCADE RANGE (sub-head).

Vehicular Tunnels. Development of the automobile and motortruck has necessitated the construction in many places of tunnels solely for motor-propelled vehicular traffic. The Holland tunnels under the Hudson River, connecting New York City at Canal Street with Jersey City at Twelfth Street, are notable examples of this class of subterranean and subaqueous construction. These tunnels, opened in 1927, consist of two tubes, each 3,000 yards in length between the portals. Except for the land approaches, they consist of circular cast-iron rings, twenty-nine feet in exterior diameter. Each tube provides for two lines of traffic in one direction only, with a roadway width of twenty feet. The tubes beneath the river were driven with shields under compressed air. Artificial ventilation is provided. About 52,000 vehicles have used the tunnels in a single day, without taxing their capacity. The cost of the Holland tunnels was about \$48,000,000, and tolls are collected.

The River Mersey vehicular tunnel, between Liverpool and Birkenhead, England, is the largest circular-tube tunnel in the world, having an outside diameter of forty-six feet three inches, and an inside diameter of forty-four feet. The main roadway provides for four lines of traffic and two footwalks. The total length of the tunnel is a little less than three miles.

Railroad Tunnels. The ten longest railroad tunnels in the world are listed below:

NAME	MILES
Simplon, between Italy and Switzerland.....	12.45
Pennsylvania R. R. Tunnel, New York.....	11.7
Apennine, between Florence and Bologna.....	11.3
Saint Gotthard, between Switzerland and Italy.....	9.25
Loetschberg, in the Swiss Alps.....	9.04
Hudson and Manhattan, New York.....	8.5
Mont Cenis, between France and Italy.....	7.97
Cascade, between Berne and Scenic, Washington.....	7.79
Arlberg, between Innsbruck and Bludenz.....	6.36
Moffat, through the Continental Divide, Colorado.....	6.21

Related Subjects. In the following articles the reader will find descriptions of various important tunnels:

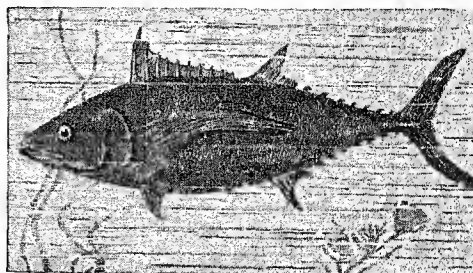
Hoosac Tunnel	New York City (Tunnels)
Hudson River Tunnels	Saint Gotthard
Moffat Tunnel	Simplon
Mont Cenis Tunnel	Subway

TUNNEY, JAMES JOSEPH (Gene). See PRIZE FIGHTING.

TUNNY, OR TUNA, the largest fish of the mackerel family, found in all warm ocean waters. The name *tuna* is the one more commonly heard in America, where the fish is rapidly increasing in favor. The fisheries off the California coast are the most important, especially those along Catalina Island. Because of the large size and the fighting spirit

of the fish, tuna-fishing is regarded as rare sport by anglers who enjoy a stiff fight. These fish sometimes reach a length of over ten feet and a weight of 1,500 pounds, but such giant specimens are rare.

A tunny feeds largely on squid and smaller fish. The body is shaped much like that of the ordinary mackerel, but is thicker; the tail is so



THE TUNNY, OR TUNA

widely forked as to approach the form of a crescent. In Europe the most important fisheries are in the Mediterranean Sea, where the fish are captured in nets. The flesh is sold fresh and in cans; in Italy different parts of the fish are packed separately and marketed under special names. The flesh tastes somewhat like chicken, and is an excellent food. Canned tunny makes a delicious salad. L.H.

Scientific Name. The tunny, called *albacore* and *horse mackerel* on the American Atlantic coast, is known scientifically as *Thunnus thynnus*.

TUOLUMNE, twahl' um ne, RIVER. See YOSEMITE NATIONAL PARK.

TUPELO, tu' pe lo. See PEPPERIDGE.

TUPPER, the family name of two public men, father and son, who were prominent in Canadian history.

Sir Charles Tupper, Bart. (1821-1915), was one of the foremost Canadian statesmen during a long and important period in the development of the Dominion. He was responsible for the adherence of Nova Scotia to the Confederation; later was a member of Sir John Macdonald's Cabinet; then Canadian High Commissioner to Great Britain; and finally, at the age of seventy-five, Premier of Canada. During the closing years of his life, Tupper shared with Lord Strathcona the distinction of being "the Grand Old Man of Canada."

Tupper was born at Amherst, N. S., was educated at Horton Academy, Wolfville, and in 1843 was graduated in medicine from the University of Edinburgh. He began practice at Amherst, and for twelve years was a general practitioner.

In 1855 he entered politics as a Conservative candidate for the Nova Scotia assembly. He was elected, and represented Cumberland County for thirty years, first in the assembly and afterward in the Dominion Parliament, and in 1864 rose to the premiership of Nova Scotia. During the next three years, Dr. Tupper was most active in promoting Confederation, and it was due mainly to his efforts that Nova Scotia joined the union.

In 1867 he resigned as premier of Nova Scotia, and in 1870 he entered the Dominion Ministry as President of the Council; in 1872 he became Minister of Inland Revenue, and in 1873 Minister of Customs, under Sir John Macdonald. Five years later, he became Minister of Public Works, and was knighted. The next year, at his suggestion, the Department of Railways and Canals was created, and he was its first Minister. In 1883 Sir Charles went to London as Canadian High Commissioner, at the same time retaining (until 1884) his position in the Dominion Cabinet. In 1887 he was called back to Ottawa by a crisis in the affairs of the Canadian Pacific Railway, and for a year, as Minister of Finance, labored to place its finances on an easier basis. He then returned to London as High Commissioner, and in the same year (1888) was created a baronet.

He remained in London until 1895, when he was called again to Ottawa, to assume the leadership of the Conservative party as successor to Sir Mackenzie Bowell. Sir Charles became Premier in April, 1896, but the Conservative party was so weakened by internal quarrels and defections of prominent members that it was defeated in the general elections in June. Sir Charles thereupon remained in Parliament, representing Cape Breton, his second constituency, until 1900, as leader of the opposition. He then retired from public life, and afterward resided in England, where he died. He was buried at Halifax. His *Recollections of Sixty Years*, published in 1914, throws interesting sidelights on Canadian political history.

Sir Charles Hibbert Tupper (1855-1927), the son of Sir Charles Tupper, was born at Amherst, N. S., and was educated at McGill University and at the Harvard Law School. His entrance into public life was accidental. In the early stages of the political campaign of 1882, there was a factional fight among the Conservatives in Pictou, N. S. While the deadlock was in progress, both sides consulted young Tupper to see if he, presumably through the influence of his father, could effect a friendly settlement. Neither of the two candidates for the House of Commons would retire in favor of the other, but both accepted Tupper as a compromise candidate. Tupper was elected, and thereafter served in the Commons until 1904. From 1888 to 1895, he was Minister of Marine and Fisheries, and in 1895-1896 was Minister of Justice and Attorney-General.

In 1893 Tupper was British agent before the tribunal which arbitrated the Bering Sea Controversy. For his services he was knighted by Queen Victoria. In 1896, when his father became Premier, Sir Mackenzie Bowell suggested that the younger Tupper succeed his father as Canadian High Commissioner at London, but the father decided to appoint Lord Strathcona and kept his son in the Ministry as Minister of Justice. Sir Charles Hibbert, after 1897, practiced law at Vancouver, and in 1904 retired from public life.

TURAN. See IRAN.

TURBAN, the name of a headdress, having special reference to that worn by men in Mohammedan countries. This name is of the same origin as the word *tulip*, both being derived from the Turkish *tulband*, an adaptation of the Persian *dulband*, applied to a scarf wound around the head. There are many variations in the style, size, and color, but in general the turban is a scarf of silk, linen, cotton, or other

cloth, folded around the head, or about some sort of a cap. Turbans in Oriental countries show distinctions of rank, profession, and social position. In India, the priests usually wear white headdresses; the native princes wear gaudy and ornamental ones, often pro-



TURBANS

(a) Style worn by Christian priests in Northwestern Asia; (b) Morocco turban; (c) Syrian; (d) turban of citizen of Damascus. In the National State of Turkey the turban is disappearing; the European hat has taken its place (among officials by government decree).

fusely decorated with jewels. In the days before Turkey became a republic and adopted modern dress, its sultan wore a turban containing three heron's feathers, and further adorned with precious stones. Two heron's feathers appeared in the turban of the grand vizier, and one in those of other officers.

From time to time, it has been fashionable for women in Europe and America to wear hats that are a modification of the Oriental turban, some being small, close-fitting, and usually becoming, while others at times have been such as are alluded to in *Cranford*, Mrs. Gaskell's classic of village life:

I was anxious to prevent her from disfiguring her small, gentle, mousey face with a great Saracen's-head turban.

The gaudy headdresses worn by negro women in the West Indies and the Southern United States are also known as turbans.

TURBINE BONES. See FACE.

TURBINE WHEEL, or **TURBINE,** *tur' bin*. A turbine is a machine capable of transforming the energy available in nature into a form convenient for use, such as a shaft turning against a resistance. Turbines may be operated

by a variety of fluids such as water, steam, gas, or air.

In the operation of any turbine the operating fluid is caused to flow through rigid curved channels in which the magnitude of direction of the relative velocity or both is changed. The force necessary to cause this change of velocity is supplied by the rigid channels. The fluid in turn reacts against these curved channels, causing them to move. The channels are secured to the circumference of a wheel and the force acting on them causes the wheel to revolve against a resistance, thus developing power.

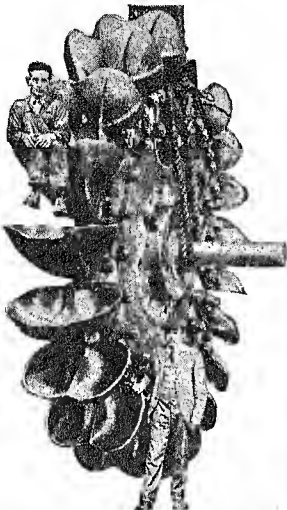


Photo: Allis-Chalmers Mfg. Co.
PRESSURELESS OR IMPULSE
TURBINE

Two general types of water turbines are in common use: (a) *pressure* or reaction turbine; and (b) *pressureless* or impulse turbine.

The type of turbine illustrated is used chiefly in high-head plants where the power relative to the head is small, and lower speeds are desired.

In the pressure turbine the moving wheel, called the runner, is set below the surface of the water and the water flows through the curved channels by gravity. Due to the fact that it is desired to get the water into the runner with the least possible loss of energy, guide vanes are provided in a ring outside the entrance to the turbine channels. These direct the water into the runner, and also serve to regulate the amount of water admitted so as to regulate the speed. After the water has passed through the runner or turbine wheel it flows into the so-called draft tube. This is merely a conduit in which the area increases in the direction of flow, so that the final velocity of discharge, and hence the discharge loss, is reduced. The larger power plants usually have wheels of this type.

In the pressureless turbine the water is led to the wheel through a pipe and is discharged through a nozzle onto the wheel. The wheel is provided with curved channels or buckets. These turn the direction of the water through an angle of nearly 180° , and the resultant force causes the wheel to revolve. These wheels are sometimes called *impulse* wheels or *Pelton* wheels and are used for conditions where the power relative to the

head is small. They are used for heads of water up to over 5,000 feet. Small household water motors are often of this type.

The operation of all turbines is due to the pressure of the water, causing flow through one or more nozzles, or channels which operate as nozzles. An increase in the head of water results in a direct increase in the potential energy of the water supplied, as well as an increase in the amount of water delivered to the wheel. Since the latter varies as the square root of H we see that the power of a turbine varies as $H\sqrt{H}$, or the three halves power of the head.

The rotative speed of a turbine varies as \sqrt{H} . Water turbines have been built in sizes up to over 100,000 H.P. in a single wheel, and are able to yield efficiencies up to about 94 per cent.

Steam turbines operate on the same general plan as water turbines, but differ considerably in detail of construction. The expansive

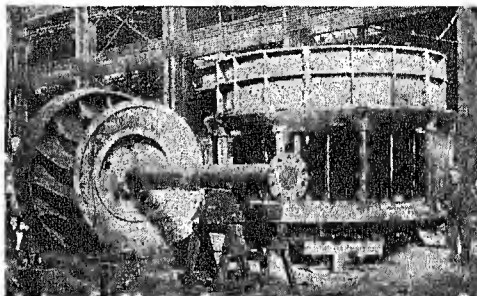


Photo: Allis-Chalmers Mfg. Co.
PRESSURE OR REACTION TURBINE

This type of turbine is used mainly in low-head plants where a relatively large amount of power is desired, at the highest possible rotative speed.

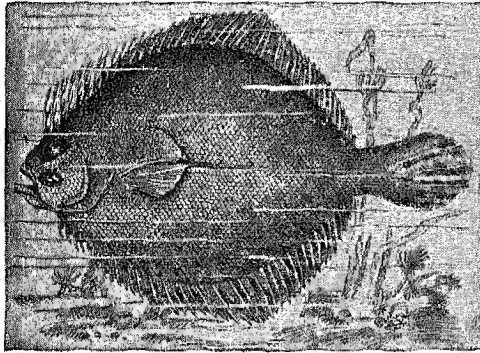
effect of the steam is one of the main reasons for this difference.

The full pressure of the steam may be used in one stage or wheel, but more often it is divided among a number of wheels, all of which are housed in one casing and mounted on a common shaft.

See also the article WATER WHEEL. A.F.Sh.

TURBOT, one of the largest of the flat-fishes, and one of the species that is of most value commercially. It is seldom longer than two feet, and weighs from eighteen to thirty pounds, although ninety-pound turbot have been caught. It has a very flat, wide body, with a long fin on the top and bottom ridges. Its upper surface is brown and covered with hard, round knobs. The turbot is a sea fish, and its eggs—five or ten million to a fish—float on the ocean surface, but the full-grown turbot prefers a sea bank, where it lies on its lighter side. Both the eyes are on the left side of the body. The turbot abounds off the

western coast of Europe and in the Mediterranean, where it is caught for export. It is the fish most highly esteemed in English cookery. See FLATFISH; FLOUNDER. L.H.



However great the dish that holds the turbot, the turbot is still greater than the dish.

—MARTIAL: *Epigrams*.

Scientific Names. The European turbot is *Rhombus maximus*. An American species, the sand dab, or windowpane, *Lophopsetta maculata*, is found on the Atlantic coast.

TURCOS. See ZOUAVES.

TURGENEV, *tur gen' yef* (also spelled TURGENIEFF), IVAN SERGEYEVICH (1818-1883), a Russian novelist, born at Orel. His father had married a rich woman, and the boy was trained for the life of a cultured country gentleman. He was educated in the universities of Moscow and Saint Petersburg (now Leningrad), and under private instructors at Berlin, and knew German and French much better than his native tongue. It was the custom of the day for the aristocracy of Russia to scorn their own language, and Ivan's mother would not use it in her home circle. However, a Russian peasant aroused his admiration for the language and literature of his native land by reciting some early Russian poetry, and the young man began to write for native periodicals. He lived as a Bohemian until his mother's death in 1850 which made him rich, and he freed the serfs whom she had treated so cruelly.

In 1852 Turgenev won praise for *A Sportsman's Sketches*, describing the sufferings of Russian peasants. This book, sometimes called "the Russian *Uncle Tom's Cabin*," hastened the emancipation of the serfs. *A Nest of Nobles* drew a vivid contrast between the

aristocracy and the working classes of Russia, and this was soon followed by works of the same character, *Fathers and Sons*, *Smoke*, and *Virgin Soil*. Pessimism and realism are never absent from these stories, but their plots are so skillfully woven and their characters so strongly drawn that readers almost forget the tone of melancholy. His last years were spent near Paris, and he was buried in Saint Petersburg.

Turgenev coined, in his *Fathers and Sons*, the word *nihilist* (a man "who bows before no authority, and accepts no principle unproved"), which later figured so largely in many writings about Russia. Accuracy of observation, deep sympathy and understanding, good characterization, and fine style are the main features of his writings. He was the first Russian author to be read and admired by Europe, and was especially popular in France. A.P.

See NIHILISTS AND NIHILISM.

TURIN, *tu' rin*, the Italian city of TORINO (*toh re' no*), lies in a beautiful plain of Piedmont, surrounded by mountains, on the River Po. It is eighty miles northwest of Genoa and seventy-six miles southwest of Milan. In summer, Turin is one of the most attractive places in the north of Italy. On the left bank of the Po are the beautiful parks and botanical gardens, and there are many inviting walks along the stream. On a hill overlooking the city from the east rises the great church of La Superga, now the mausoleum of the House of Savoy. The summit of the hill, which is reached by a cable railway, affords a magnificent view of the city and its surroundings.

Turin is different from most Italian municipalities because of its regularity. The city dates from Roman times, and has been prominent in European history. Hannibal captured it after crossing the Alps, in 218 B.C. It was partly burned down in A.D. 69. From 1861 to 1865, it was the capital of the kingdom of Italy. The royal palace and park still remain. The educational institutions include a university founded in 1405; military schools, an observatory, academy of sciences, and museums. There is a notable collection of arms and armor in the palace, and a library rich in manuscripts.

Turin is a flourishing and important industrial center, particularly for the motorcar and silk industries. It has developed as an important military station, because of the proximity of the French boundary and the Alpine passes. The population (of city and suburbs) is 629,115 (1936). Only Milan, Naples, Genoa, and Rome surpass it in size.

TURKESTAN, *toor keh stahn'*, officially TURKISTAN, a name applied to the region in Central Asia extending eastward from the Caspian Sea to the boundary of China, and from the Siberian steppes southward to Persia,



Photo: Brown Bros.

TURGENEV

Afghanistan, and India. The term was originated to designate the lands occupied by the Turkish races, but its significance has been lost, for Turks live in other lands, and other races occupy part of Turkestan. As understood today, Turkestan may apply either to the territory in Asia under Russian control, known as Western, or Russian, Turkestan; or to East, or Chinese, Turkestan.

Russian Turkestan extends from the Caspian Sea east to Kirghiz and Sinkiang. On the north it is bounded by Kazak, and on the south by Persia, Afghanistan, and India. It includes the constituent republics of the Soviet Union, Uzbek, Tadzhik, and Turkoman. Its famous Golden Road was once followed by Marco Polo (which see).

Chinese Turkestan, situated in the heart of Asia, extends east from Russian Turkestan to the Gobi Desert and Tibet. It is enclosed between the Tien Shan ranges on the north and the Kunlun Mountains on the south. It is now a part of the Chinese province of Sinkiang (which see).

History. Through this country passed the caravans of early times, bearing the products of trade from the East to the West, and back. Bokhara and Samarkand were rich commercial cities in the sixth century, when they were conquered by the Turks. Following the conquest of Persia by the Saracens, about the seventh century, the country beyond the Oxus River was soon overrun by the Mohammedans, and looted for its riches. In 1073 Malek Shah, sultan of Turkey, annexed Turkestan, and it was numbered among the conquests of Genghis Khan early in the thirteenth century. Timur, the Tartar, a direct descendant of Genghis Khan, became very powerful through his struggles with the petty chiefs in Turkestan, and set up a dominion with Samarkand as his capital. He reigned from 1370 until his death, in 1405. Bokhara and Samarkand were centers of Mohammedan culture during the fourteenth and fifteenth centuries.

The Kirghiz tribes with their two main branches, Kazak, or Cossack (not to be confused with the Russian military groups known as Cossacks), and Kara (Black), represented the most disturbing element in Turkestan, and their raids were the constant dread of the more peace-loving tribes. Whether it was the un-

ruliness of the Kirghiz or the ambitions of Peter the Great which caused Russia to adopt a coercive policy toward Turkestan, is a question. Be that as it may, by 1734 Czarina Anne (1693-1740) obtained the formal surrender of the Kirghiz, though it was almost the middle of the next century before they were in fact subdued. In 1865 Tashkent was stormed and taken; three years later, the same fate befell Samarkand; in 1873 the Lower Oxus, including Khiva, was conquered, and in 1876 Kokand. In 1881 the Tekke Turkomans, one of the most numerous nomad tribes of Turkestan, defended their fortress Geok Tepe, in one of the fiercest battles of these sand-and-blood wars. The capture of this fort was the most important victory of Russia in Central Asia, for it not only overcame the greatest obstacle to further territorial aggrandizement in Asia, but it brought a civilizing influence into a land whose tribes had robbed and murdered at their will, for many centuries. The Chinese were able to prevent any further invasion of Russia into Turkestan, though not without frequent recourse to arms.

In the midst of the World War, in 1916, when the races of Turkestan were asked to mobilize to fight for Russia, which they hated as an oppressor, they revolted under the lead of the Kirghiz tribes. They were punished severely for this rebellion, but were never wholly subdued. Following the Russian revolution, the Soviets extended their power into Western and their influence into Eastern Turkestan.

Afghan Turkestan. A considerable portion of the territory long called Turkestan now forms a northern province of Afghanistan, known since 1927 as the Mazar province. It is bounded on the north by the Oxus River and on the northwest by Russian Turkestan. It was long ruled by Uzbek chiefs, but has formed part of Afghanistan since 1859. The northern frontier was the subject of agreements between Russia and Afghanistan in 1873 and 1885. The area of the province is about 57,000 square miles, or almost one fourth of the total area of Afghanistan. The population is about 800,000, mostly of Persian and Uzbek stock, with some Mongols, Hindu, and Turkoman tribes. The land is rough and mountainous, and agriculture flourishes only in the river valleys, which are well cultivated. Plans for cotton cultivation on a large scale are under way. There are motor roads, telegraph lines, and airdromes in the province. The chief town is Mazar-i-Sharif, which carries on a large trade in astrakhan (which see) and furs. Like other parts of Turkestan, the province is rich in copper, iron, lead, and gold. A.P.

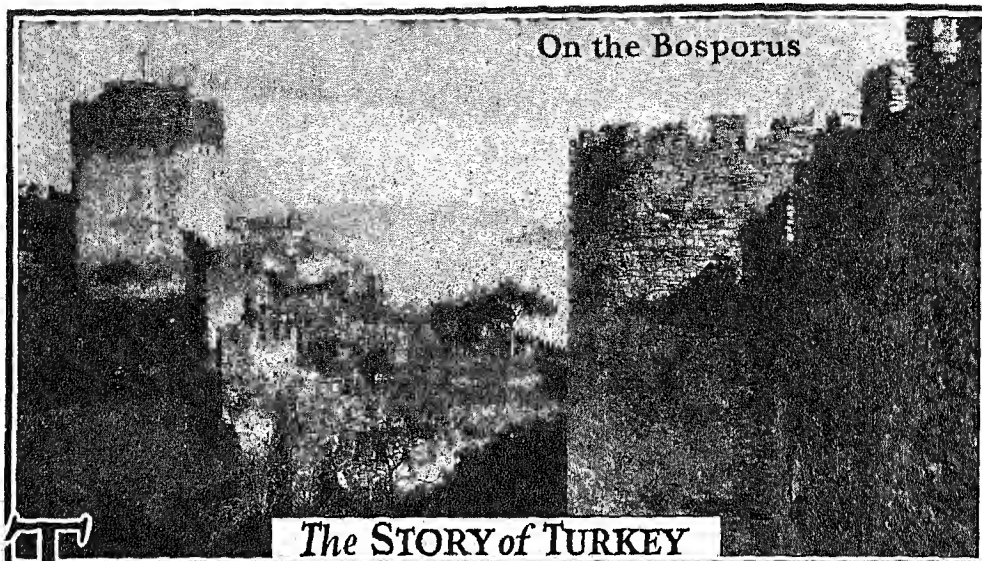


LOCATION MAP

(a) Russian; (b) Chinese. The borders of Chinese Turkestan are somewhat indefinite.

Related Subjects. The reader is referred to:

Genghis Khan	Sinkiang	Timur
Kirghiz	Tadzhik	Turkoman
Russia	Tartars	Uzbek



T The STORY of TURKEY

TURKEY. In an earlier day one of the most powerful countries of the world, whose domain spread into three continents, Turkey is now a minor state. It is important politically only for the reason that, because of its geographical position, it holds a threat to other nations whose interests clash with it. Constantinople, no longer the capital, but an important city in a favored location, is about all that remains to Turkey of its former vast territory in Europe, and it is still Turkish because the powers of Europe dare not face the hazards of wresting it from its ancient ownership. For political map, see ASIA (map).

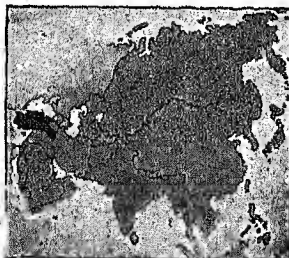
Not only territorially, but socially and politically, Turkey has changed. No longer do we hear of the *Sublime Porte*, as the Ottoman government was called in the days when the government offices were housed in a building whose entrance gate was very lofty. The sultan, head of the old absolute monarchy and of the Mohammedan faith, has been discarded with the system he represented; a dictatorial President in the Republic of Turkey has assumed the place of this rather romantic figure, and the new official group has become strangely apathetic toward the ancient religion. Turkey has turned westward for its inspiration.

On the other hand, the Western world holds various views with respect to this old country. To the commercial mind, it brings thoughts of

carpets, Smyrna figs, and tobacco; to one given to romance, it is a land where the call of the muezzin drifts out from slender minarets silhouetted against the sky, where golden-tinted domes glow in the noonday sun; to the reader of history, a land of memorable contacts with Greek, Roman, and Persian history: for in the old Turkey, particularly in that part known as Asia Minor, history is traced back many, many centuries, in a long story of conflict between Asia and Europe.

Looking into the Past. In this region called Asia Minor, and in the neighboring lands of Persia, Arabia, and India, the Aryan race probably developed from its Stone Age beginnings. Across it swept many of the barbarian tribes, and within it various kingdoms rose and fell. Phrygians, Lydians, Cimmerians, Gauls (whose descendants in Phrygia were the Galatians of Saint Paul's *Epistle*), Greeks, Persians, Romans, and Turks—all at some time have made it their home.

Who, reading of Helen of Troy, pictures that walled city besieged by the Greek heroes as a mud-walled town in what we know as Turkey? The story of the fall of Troy was, however, the first tale in the conflict between European and Asiatic. In the early days, when the Greek cities flourished, when the Persians retreated in defeat after Xerxes' unsuccessful attack upon Greece, and when the Roman state was powerful, Europe held the supremacy. But when Constantinople fell before the Turks, Asia became supreme. A long, long period has passed, during which Asia and the Turk have ruled, although the European nations have assailed the empire as it gradually weakened—England, Russia, France, Germany, sometimes together, often against one another. Some-



LOCATION MAP



Photos: Keystone

In Present-Day Turkey. Above, at left, a public letter-writer, whose business it is to write for his illiterate customers anything from legal documents to love letters; at right, street merchants in Constantinople. Below, transporting Smyrna rugs to market.



THE EMPIRE IN 1481

The black boundary lines show the limits of Turkey a few years after the capture of Constantinople (1453).

times the Turkish pawn was moved as a guard for the great Indian Empire; sometimes it barred the Russian giant knocking at the Black Sea gateway. Greedily the European powers watched it, whispering that "the Sick Man of Europe," as Czar Nicholas of Russia called Turkey, would soon die and the strategic bit of land be theirs. This hope of the nations never was realized.

Thousands of square miles of Turkey's land have been lost, but "the Sick Man" changed doctors, and now appears to be making a marvelous recovery. In the land where Greek culture once flourished, a new Turkey is being fashioned, one which its builders hope shall take its place beside the European nations. Time alone can prove whether the stage so long set for the conflict of Asia and Europe has been changed.

Area and Location. The Turkish Empire, also known as the Ottoman Empire, was once worthy of the name of empire. To the sultans belonged the European regions of Greece, Macedonia, and the Balkans; in Asia, they ruled over Asia Minor, Armenia, and Kurdistan, Mesopotamia (Iraq), Syria, and part of Arabia; in Africa, over Tripoli and Egypt. Vast and unwieldy, the empire was called Turkey in Asia and Turkey in Europe, to distinguish its regions so widely separated in nationality and location.

Plunged into the caldron of war too often, the vast empire shrank until the present Turkey in Europe consists of the cities of Constantinople and Adrianople, and the small part of Thrace around Adrianople; while all that is left of Asiatic Turkey is the province of Anatolia, or Asia Minor, and Imbros, Tenedos, and Rabbit islands, in the Mediterranean. The African possessions were lost in 1912 and 1913. The total area is estimated at 294,492 square miles. The nation's first census was taken in 1927; the third, taken in October, 1940, showed a population of 17,869,901.

The People. In the years following the overthrow of the Ottoman Empire, a marked change took place in the population of Turkey. The fortunes of war, and the wholesale exchanges of Greeks and Armenians within the republic for Turks living outside the new limits of Turkey, reduced the variety of nationalities once so characteristic of the empire. The aim of the nation to-day is a new Turkey, one and indivisible, a government no longer based upon force and a religion, but welded together by true nationalism and the desire to see Turkey no more "the Sick Man of Europe," no longer the plaything of the powerful European nations, but their equal. To this end, a steady policy of Westernization is being followed in education, social life, laws, foreign policies, and commerce.



BOUNDARIES OF THE EMPIRE IN 1683

The map emphasizes the dismemberment of the Empire, with the dates at which the various provinces were lost.

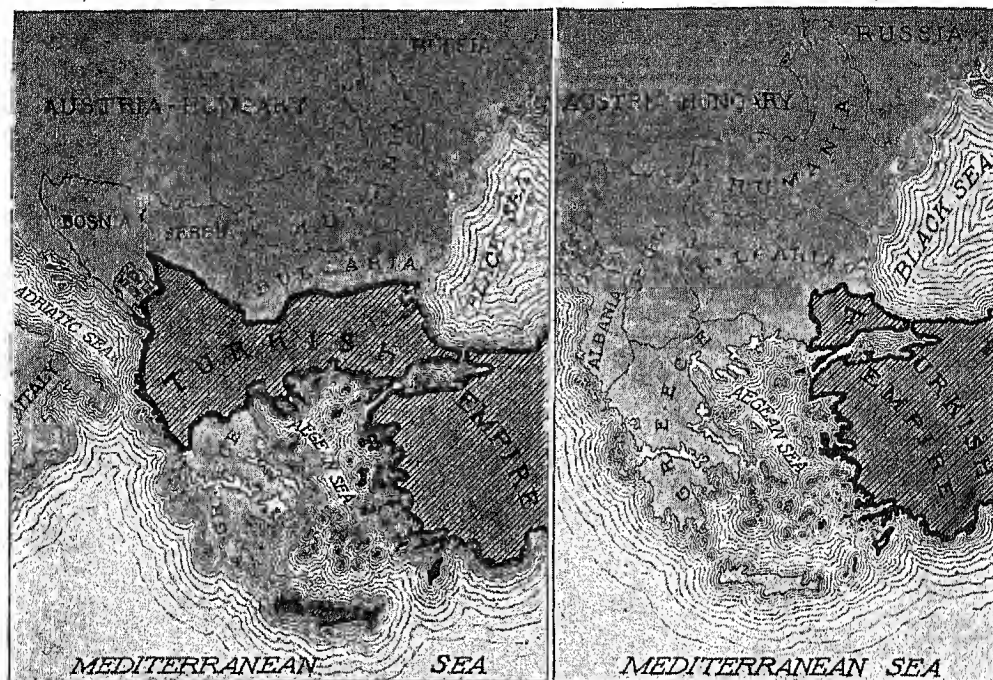
Social Life. Turkish men have laid aside the fez, the red cap so long symbolic of their race. Upon the streets and in the theaters, men and women are seen together. The new status of women is perhaps the most obvious social change. Before World War I, the more intelligent class of Turkish women were already restive; some were attending the foreign schools and there acquiring Western ideas. During the war, many women went as nurses to the hospitals and battlefields, while others filled the positions of men who were at the front.

With the coming of the republic, almost complete freedom has been achieved. The veil is now optional, and about ninety per cent of the women wear European headgear. Upon the streets and in public conveyances, women are free to come and go as they choose. In the universities, in the courts, in offices, even upon the stage, the Turkish women are seen; these are signs of the new spirit in Turkey. It is said by some that this change is but a return to the simple ways of Turkish social life as it was before the decadent influence of the Byzantine Empire was felt.

Religion. Under the republic, religion has been strictly separated from the government. The state-supported schools are not permitted to teach any religion whatsoever. When the office of sultan was abolished by the formation

of a republic, a member of the hereditary family was appointed as caliph, or religious ruler. In 1924, however, Turkey abolished even the caliphate, thus relinquishing the spiritual rule of the Islamic world for the benefits of Western progressive policies. In 1926 legislation suppressed the *Ulema*, persons formerly connected with the official duties of Islam, and considered a separate class. Only an imam, to conduct religious services, remains now for each mosque. No religious propaganda is allowed in the schools, and the compulsory attendance of Moslem pupils at Christian services is forbidden. The Moslem Friday has been abolished in favor of the Western Sunday.

Education. The new republic considers that education of the youth of the country will bring about the most constructive and complete Westernization of new Turkey, and large sums of money are being expended in that direction. The results have been gratifying, for school attendance has more than doubled since 1914. A Minister of Public Instruction has charge of education, and in 1928-1929, more than fifty-four per cent of the Turkish budget was spent for common schools. Education is compulsory in the elementary grades for pupils between the ages of seven and sixteen. Lack of teachers and equipment has been a handicap in some of the more remote



STILL SHRINKING, YET UNABASHED

At left, Turkey's boundaries as fixed by the Congress of Berlin (1878). At right, the Balkan states, showing the limits of European Turkey and the Balkan boundaries after the Balkan Wars (1913).

regions, and it has not always been possible to enforce the compulsory-attendance law. Moslem schools, closed in 1924, have been replaced by government schools, consisting of primary and secondary schools, training schools for teachers, and the University of Constantinople. Founded in 1900, the University of Constantinople was reorganized in 1918, and faculties of arts and sciences added. It is coeducational, and is the center of the new intellectual life of the republic. In all the schools, the teaching of Turkish history, geography, language, and literature by Turkish teachers approved by the government is compulsory. Special schools have been organized in which advocates may be trained to administer the new laws; women are being graduated from these schools and taking their places in the courts of the new Turkey.

Before World War I, Americans maintained about five hundred educational institutions, but the greatest number of these are in territory no longer Turkish. Two American colleges in Constantinople, Robert College for men and the Woman's College, are very well known. Robert College was founded in 1863 as part of the New York State University, and was officially recognized by Turkey six years later. Between 3,000 and 4,000 students have been educated there since its organization. Another American college is the International

College at Smyrna. There are many other foreign schools conducted more or less on missionary lines, and all foreign schools are under the same regulations as the private Turkish schools. One of the most far-reaching changes made by the new government was the adoption of the Latin alphabet to replace the Arabic symbols. (See below, *History*.)

The Cities. Foremost among the Turkish cities is Constantinople (since 1929, Istanbul), once a truly royal city, one of the most important on earth, the meeting place of the East and the West. On the Aegean coast is Smyrna (now Izmir); it is 2,500 years old, and at one time was a great cosmopolitan city. Since the greater part of the Turkish republic is in Asia Minor, it is in the cities of this section that future development must come. The more important ones are described below.

Adana, now Seyhan, thirty miles from the Mediterranean, is situated on the right bank of the Seihan River. It is in the cotton section, and has prospects of becoming an important industrial city. Adana is strategically located, for it commands a passage through the mountains to Syria, on the southwest. A railway connects it with Tarsus. Small boats are able to navigate the Seihan River to Adana. This is a very ancient city, which has been restored at intervals, beginning in the eighth century. It rivaled Tarsus in importance in the days when it was a famous military post for the Romans. Population, 89,990 (1940).



THE REPUBLIC OF TURKEY

Adrianople (since 1929, Edirne) is located in the small strip of Turkish territory which, with Constantinople, remains in Europe. It is only a few miles from the boundary of Bulgaria, and is situated where the Maritsa, Arda, and Tunja rivers meet, about 137 miles by rail west and north of Constantinople. Its position, to which was due its once great commercial importance, was responsible for its being the scene of almost constant warfare from 1912 to 1923.

According to historical records, Adrianople was founded by the Emperor Hadrian (A.D. 76-138), on the ruins of an ancient Thracian city. During the Balkan Wars, it was besieged by the Bulgarians and Serbians for six months, and surrendered on March 27, 1913, only to be recaptured four months later. Queerly shaped wooden buildings line the narrow, crooked, alley-like streets. The surrounding country is rich in agricultural products, and fruits are grown, from which some of the finest Turkish wines are made. The principal exports are raw silk, cotton, opium, rosewood, wax, and turkey-red dye. The manufactures are silk, woolen, and cotton stuffs, attar of roses, and leathers. The population in 1905 was about 80,000, but migration of non-Turkish races following World War I reduced it to about half that figure. Population, 45,168 (1940).

Angora, called by the Turks Ankara, *ahn kah' rah*, in the interior section of the new republic, is the centrally located Turkish capital, well fortified by nature and man. Unlike Constantinople, it is not exposed to outside attack or influence. It is located upon a rocky hillside, almost unassailable from the rear, and protected in front by a vast open plain. There is excellent rail and telegraph connection with

Constantinople. Long the seat of the Council of the Nationalist party, it was here that the National Pact, the Turkish Declaration of Independence, was drawn up. After the seizure of the first Assembly at Constantinople by the British, such deputies as escaped made their way to Ankara, where the Assembly was reconvened. Thus Ankara was a natural choice for the new capital, one which should break away from traditions of the old and opposition to the new, which hung so heavily over the city of the sultans.

Once a flourishing city, dating from the third century B.C., Ankara later became an unimportant inland town, with narrow streets and mud brick houses. In the revolutionary changes after World War I, Ankara not only became the capital of a reborn nation, but almost overnight was transformed into a modern city. Plans practically to rebuild the entire city were made by a noted German city-builder, Herman Jansen, and approved by the President of Turkey. The traffic problem, which has harassed so many cities built before motor cars became so numerous, has been solved by providing main arteries with crossings only every five blocks. No buildings face on these highways, and a minimum of stops permits an average speed of sixty miles an hour, without danger.

A large portion of the old city has been torn down, and more than 3,000 new buildings of approved Western style have been erected, many of them fine government buildings, schools, and hotels. Modern drainage and sanitation have been introduced as rapidly as equipment and skilled labor have been procured. Streets have been paved, a power station to supply the city with electric lights has been erected,

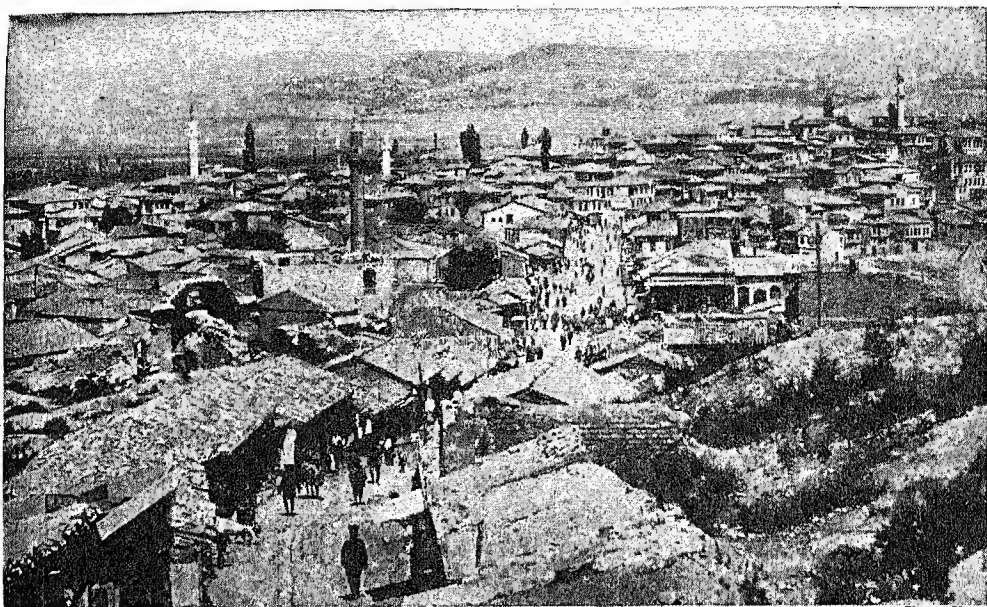


Photo: U & I

SLEEPY ANGORA (ANKARA) BECOMES A MODERN CAPITAL

and many factories with modern equipment have been constructed. In 1925 a telephone exchange and a powerful wireless station were installed. The chief manufacture is mohair cloth, and wool, mohair, and grain are exported. Population, 155,544 (1940).

Bursa, *bur' sah*, is an ancient and very beautiful city near the Sea of Marmora, and might have been chosen as the new capital but for its nearness to the sea, which makes it easily open to attack. It is said to have been built by order of Hannibal. It is a center for the silk-spinning industry. Population, 77,348 (1940).

Konya, *ko' ne ah*, in the south-central section, is an important railway center and the starting point of the Baghdad Railway. Population, 56,698 (1940).

Samsun, *sahm soon'*, on the Black Sea, is an important shipping point for tobacco, the finest variety being raised in this region. Population, 36,917 (1940).

Trebizond, since 1929, Trabzon, on the Black Sea, is an ancient town, commercially important since early Greek times, because the chief trade route from Persia to Europe descends to the sea at this point. Population, 33,040 (1940).

The Land and Rivers. The western part of Turkey in Asia is the ancient Asia Minor through whose mountain passes, for many centuries, caravans laden with Oriental riches reached the island-fringed coast. The modern name for the section is *Anatolia*, derived from Greek words which mean *to rise*, and having reference to the table-lands which rise to an average elevation of 3,000 feet. These reach nearly to the sea, where they suddenly drop and form a narrow, fertile belt known as the *Levant*.

The table-land is not well adapted to agriculture, save where redeemed by irrigation, which is practiced in few sections. Ancient

peoples had irrigation systems much more extensive than any which exist to-day in the region. The surface of the plateau is largely treeless, with numerous salty lakes and marshes, and evidences here and there of former volcanic activity. It is essentially a grazing country, with high and low ranges of temperature. In the east there are mountain peaks 12,000 feet high, while on the south the Taurus Mountains rise about 7,000 feet, with several peaks reaching altitudes of over 10,000 feet. Valuable forests clothe the mountains which border this table-land. It is estimated that, of the 20,765,000 acres under forests, the state owns about eighty-eight per cent.

Several rivers cut across this plateau, or table-land, and empty into the Black Sea or the Aegean Sea.

Climate. Along the coast the climate is that of the Mediterranean countries, with hot summers, cool nights, and winters tempered by the sea; in the interior, the summers are hot and dry and the winters long and cold.

Agriculture. Although Turkey is chiefly an agricultural country, the methods in use have been very primitive. Of three former hindrances to agriculture—bandits, excessive tithes, or taxes, and lack of transportation—the first two have been removed, and transportation is being rapidly improved. The chief difficulty in the early years of the republic was lack of finances, a drawback felt throughout all departments. Turkey preferred to make progress slowly, without the help of foreign finances, but also without the burden of foreign interference.

Both railroads and government did much to assist the farmers. Railroads distributed seeds on deferred payment, and carried agricultural machinery at half the freight charge; while the government distributed machinery free, encouraged coöperative societies, and established an agricultural bank. Many agricultural schools were established in various parts of Turkey.

The farm of Kemal Atatürk (1881-1938) near Ankara was designed as a model for the new era. Good farm buildings, tractors, threshing machines, and all the modern Western implements and methods were employed. The farm was organized for fruit-growing (with a modern canning factory), vegetable- and crop-raising, and stock-raising. Other model farms, smaller than that of the President, were organized, and on them the work of training agricultural experts was started.

The principal agricultural products of Turkey are tobacco, cotton, figs, olives, fruits, and nuts. Tobacco and raisins are among the heaviest exports, while silk, cereals, wool, and timber products are other important items. The cultivation of a fine grade of tobacco in the Samsun area is increasing; six foreign tobacco-trading firms have established branches there. Sugar beets have been introduced, and have proved successful. Stock-raising is highly important, and Angora goats and sheep are a source of wealth to both agriculture and industry.

Fisheries. Turkey has a valuable source of income in the waters of the Black Sea and the Bosphorus, for anchovies, mullet, sturgeon, and tunny abound, and are fully exploited. Lobsters, mussels, and oysters are found in the Sea of Marmora. Unfortunately, the migrations of the non-Turkish population which followed the advent of the republic took many of the best fishermen from Turkey.

Mining. Mining has received little attention, but Anatolia holds riches for the future. Gold, coal, lead, copper, salt, and petroleum are found in abundance. The mines near Eski-Shehr are the chief source of meerschaut, valued in the manufacture of pipes. Oil in the Mosul area added to the difficulty of assigning that region, but a satisfactory arrangement was finally reached, whereby Turkey receives a revenue from oil obtained there, although it was obliged to relinquish the land to Iraq. A rich vein of coal has been discovered, running parallel to the Black Sea, from Ereğli to Queboli.

Industries. The deportation of the Greeks and Armenians in the exchange of population after World War I was a serious blow to Turkish industry, as these races had furnished the merchants and business men of the old empire. Vigorous measures were taken; several industries, such as the exploitation of salt

and the manufacture of tobacco products, matches, and cigarette paper, were nationalized, and the government supervised the manufacture and sale of alcohol and alcoholic beverages. Factories were given government assistance and relief from certain taxes, while

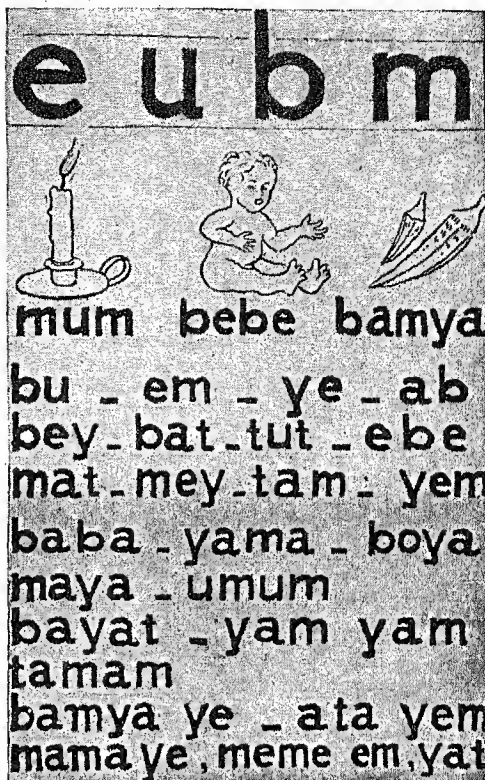


Photo: O R O C

CHANGING THE ALPHABET IN TURKEY

The late Kemal Atatürk, organizer of the new Turkey, attempted to raise the people from their unlettered condition to one of comparative enlightenment. The old Turkish letters have been discarded, and the English alphabet has been adopted. Above is a lesson in the new form of letters, taken from a Constantinople daily paper. The newspapers are ably seconding the efforts of the government.

a bank similar to the agricultural bank was established, to give aid to new industries and commercial undertakings. Carpet-weaving is still one of the chief industries; the manufacture of rugs, cotton, and mohair goods, and the curing and exporting of tobacco, or its manufacture into cigarettes, furnish employment for many. In 1925 a cotton mill operating 8,000 spindles was established in the Adana district, and sugar factories have been established in a number of towns.

Transportation. When the World War began, in 1914, Turkey in Europe had 1,050 miles of railroad; Asiatic Turkey had 2,835 miles. Constantinople had direct communica-



Photo: Leonhardt-Public

TURKISH PEASANTS

Some wearing Turkish, others western, clothing, this group of Turks awaits the passing of a holiday parade.

tion with Paris and Berlin, and had not the war put a stop to development, it would soon have had a rail route through Baghdad to the Indian Ocean.

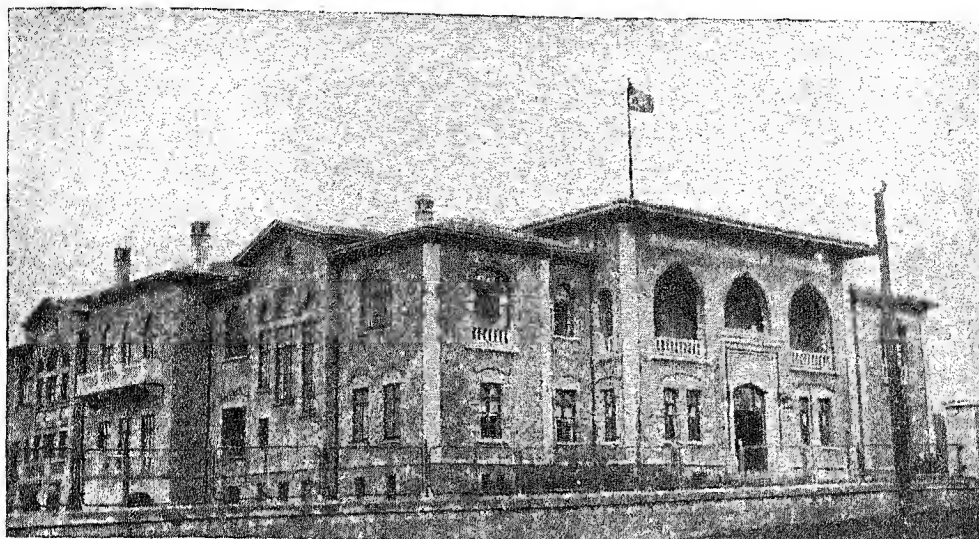
The total length of railway in 1940 was about 4,600 miles, and there was considerable more mileage under construction. Besides the railroad property and equipment which were destroyed by ravaging armies, Turkey lost over 1,500 miles of railway in readjustments after World War I, but new railways are being constructed as rapidly as funds are available. The Anatolian Railway, running from Istanbul to Ankara and Konya, is one of the main roads. Among the newer railways are the Ankara-Sivas, Samsun-Sivas, and Ankara-Eregli lines. American engineers received a contract from the Turkish government in 1928 to build 750 miles of new railway. They were also authorized to construct two ports at Mersine on the Mediterranean and Samsun on the Black Sea. There is daily air service between Istanbul and Ankara.

The Turkish Government

In the very early days, the Turks were a nomadic people, wandering with their herds across the Asiatic countries. Theirs was not an idle, vagrant existence, for a well-developed social organization held them together under

the firm rule of their chieftains. Because they were so well organized, the Turks formed a wonderful fighting machine, which swept over Asia into Europe and to the very doors of Vienna. When these people settled down in their conquered territory, their organization continued, and the chieftain became the despotic sultan of the old Turkish Empire, ruler of a heterogeneous people—Turks, Kurds, Armenians, Bulgarians, Jews, and Greeks. With no common element of race or religion to hold this vast empire together, force became the ruling power, and a great army of governors and petty officials exercised this power; with this system, the political rivalry, graft, corruption, and violence developed that made life miserable for all the people of the empire. Much was told, by missionaries seeking funds, of the terrible plight of the Christian Greeks and Armenians, but the Turk, too, suffered, under the excessive tithes and the abuse of the political system.

In 1908 the Young Turks revolted, and the sultan restored a Constitution that had been granted in 1876, but suspended two years later. Until 1922 Turkey was, therefore, a limited monarchy, although the appointment of Senators and officials by the sultan meant that his autocratic rule was but slightly impaired. Foreigners were not concerned in these



THE PARLIAMENT BUILDING

Photo: O R O C

changes, for they had obtained special courts and special privileges known as "capitulations." The chief influence brought to bear upon the sultan's government was that of the European nations, which by political treaties alternately threatened or supported Turkey, as best suited their interests.

Since the decree of 1923 and the Constitution of 1924, Turkey has been officially the National State of Turkey, ruled by a National Assembly, and with a President instead of a sultan (see *History*, below). The Assembly exercises the legislative power directly; the executive power is entrusted to the President, who is elected by the Assembly to serve a term corresponding

to the term of the body which elects him; and to a Cabinet, chosen by the President. The Assembly enacts the laws, makes war, treaties, and concessions, and it also controls financial affairs.

The unwieldy vilayets have been abolished, and the name is now given to provinces or departments. Each vilayet has an elective council of its own; at its head is a *vali*, representing the government. The foreign "capitulations" have been abolished. The secularization of the Moslem courts, schools, and laws, and complete separation of Church and State, are drastic steps in the Westernization of Turkey, which is the aim of the Nationalists.

History of Turkey

European Empire Established. The Ottoman Turks were originally an Asiatic people, and their movement westward from their home in Iran began in the early thirteenth century, when they made their way to Asia Minor. Here Osman, or Othman, from whom their name is taken, built up an independent empire on the ruins of that of the Seljuk Turks. The sultans who followed Osman not only spread their rule over all of Asia Minor, but extended it into Europe as well, gaining possession of Serbia, Bulgaria, Greece, and Macedonia.

More than once the Turkish armies were led against the great stronghold of Constantinople in vain, but in 1453 Mohammed II, "the Conqueror," captured the city, and the Byzantine Empire was at an end. Constantinople was made the center of Turkish rule.

Centuries of Conflict. Mohammed II attempted wider conquests in Europe, aiming especially at Hungary. The empire continued to prosper for about a century, and under

Solyman the Magnificent (reigned 1520 to 1566), it reached the height of its power and splendor.

The sultans after the time of Solyman began to show that effeminacy and love of luxury which are so often the result of success, and the glory of the Ottoman state declined. In 1571 the fleets of Venice and Spain inflicted a severe defeat upon the Turkish fleet in the memorable Battle of Lepanto, and in the years that followed, Persia recaptured considerable territory in Asia. At Saint Gotthard the Turkish armies were defeated by the Austrians in 1664, but the treaty that followed was not disadvantageous to the Turks. Nineteen years later, Vienna was again besieged by the Turkish forces, but Poland's king relieved the city and saved Central Europe from coming under the sway of Mohammedanism.

Early in the eighteenth century, the Turks came into conflict with another enemy, with whom they were destined to be at war inter-

mittently for over two centuries. This new enemy was Russia, which, during the reign of Peter the Great, had become a power to be reckoned with. By 1774 Russia had gained such an advantage that Turkey was forced to give up the Crimea and other territory in the region of the Black Sea, open its waters to Russian vessels, and allow Russia a partial protectorate over Wallachia and Moldavia. Another war, which lasted from 1787 to 1791, ended in further territorial loss to the Turks.

The Nineteenth Century. Turkey did not escape being involved in the Napoleonic wars, but Egypt, which was captured by Napoleon in one of his early campaigns, was later restored by England. From 1806 to 1812, Turkey was at war with Russia, and at the close was obliged to give up all claim to the territory between the Dniester and the Pruth. In 1821 Greece declared itself independent, and after an heroic struggle made good its claim. The Peace of Adrianople, which closed the Russo-Turkish War of 1828-1829, loosened Turkey's hold on some of its other dependencies.

Between 1831 and 1839, there was intermittent warfare between Mehemet Ali, viceroy of Egypt, and his liege lord, the sultan, and only the intervention of other European powers prevented the complete overthrow of Turkey. As it was, Mehemet Ali was recognized as hereditary viceroy of Egypt, owing allegiance, however, to Turkey.

Meanwhile, the Eastern Question, as it was called, had become a decided factor in the politics of Europe. Russia was determined to take advantage of Turkey's gradual weakening to aggrandize itself, while the other great powers desired the preservation of Turkey, that Russia might not profit too much. Thus, in the Crimean War, Turkey had England and France as allies against Russia (see CRIMEA). The problem was by no means settled, however, and when, in the years following 1875, the Montenegrins, Serbians, and Bulgarians rose in revolt against Turkey, Russia announced itself as their champion.

The Russo-Turkish War of 1877-1878 followed, in which the Turks were defeated and compelled to agree to terms which meant the practical disruption of the empire. Again the powers intervened, however, and in the Congress of Berlin forced Russia to surrender a large part of the advantage gained. In 1881 Thessaly and a part of Epirus were ceded to Greece; and in 1885 the revolution at Philippopolis compelled Turkey to consent to the annexation of Eastern Rumelia, its choicest province, to Bulgaria.

The Period of "Reforms." Meanwhile, within the empire revolts were almost constant. An especially serious one in Macedonia, in 1903, which the Turks attempted to put down by brutal massacres, led to the intervention

of the Western nations, whose governments demanded reforms. The sultan promised much, but performed little, and internal matters went from bad to worse. In 1908 a reform party, the Young Turks, fired with patriotic dreams of a recreated, modern Turkey, made a demand for constitutional government, and forced the sultan to accede to their demands. The first Parliament met in 1909. These disturbances gave the neighboring states the opportunity for which they had been waiting, for in 1908 Austria-Hungary announced the annexation of Bosnia and Herzegovina, and Bulgaria, the same year, proclaimed its complete independence and became a kingdom.

The Young Turks found difficulty in establishing their reform principles in Constantinople, and in 1909 they were forced to put down a serious revolt. Since this revolt had had the support of the sultan, Abdul-Hamid, they deposed him and made his brother, Mohammed V, sultan in his stead.

A Time of Wars. In 1911 war broke out with Italy, and in October, 1912, when the struggle closed, Turkey gave up its hold on Tripoli and Cyrenaica (now Italian Libia). Then, before the exhausted country had recovered from this brief but sharp conflict, the allied Balkan states declared war on Turkey (see BALKAN WARS). At the end of this war, Turkey was compelled to give up all its European territory but Constantinople, Adrianople, and a little of the surrounding region.

World War I and Its Results. Turkey joined the Central Powers in November, 1914, for Germany had a secure economic and military hold on the Ottoman Empire. Though the Turks successfully resisted an allied attempt to force the passage of the Dardanelles and capture Constantinople (February-December, 1915), they saw the gradual disintegration of the empire as the war progressed. In January, 1915, Egypt passed under British control. In 1916 the Arabian province of Hejaz, having an area of about 96,500 square miles, revolted, and an independent kingdom was proclaimed. The Arabians proved a valuable aid to the Allies in the warfare against the Turks. Jerusalem and the rest of Palestine, Syria, and Mesopotamia were conquered by the British before the Turkish government asked for an armistice, in October, 1918. The humiliating terms of the armistice which the Turks accepted, hoping to alleviate their sufferings, were made more bitter when the Allies, with their fleets and armies, occupied even more territory than the agreement allowed. The Straits and Constantinople were in the hands of the Allies, and the Greeks occupied Smyrna, in order to block Italy's designs upon Anatolia. Atrocities which followed the Greek occupation fired all Turkey with national feeling.

TURKEY

Abana.....	F 2	Bogazlyan.....	F 3	Eskişehir, 56,607.....	D 3	Kasaba.....	G 2
Adalia, Gulf of (Antalya Körfezi).....	D 4	Bolayer.....	C 5	Eğme Kaya.....	E 3	Kasaba (Turgutlu).....	B 3
Adana (Seyhan), 110,284.....	F 4	Bolu, 24,614.....	D 2	Everek.....	F 3	Kastamonu, 39,335.....	C 2
Adapazarı.....	D 2	Bolvadin.....	D 3	Fekce.....	F 4	Kavak.....	C 2
Adıyaman.....	H 4	Bosporus (Karadeniz Bogazi, strait).....	C 2	Fertek.....	F 4	Kavak.....	D 3
Afyon Karahisar, 50,065.....	D 3	Boyalik.....	F 3	Filyos.....	E 2	Kaymaz.....	F 3
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Akdagmadeni.....	F 3	Bulgurluk.....	F 4	Gediz.....	C 3	Kemalpasa.....	J 2
Akhisar.....	B 3	Bulgurluköv.....	D 6	Gelibolu.....	B 2	Kemer.....	D 4
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Akseki.....	D 4	Burbanıye.....	B 3	Geyik Dagı (mt.).....	E 4	Kepsut.....	C 3
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Alexandretta, Gulf of (İskenderun Körfezi).....	F 4	Çanakkale Bogazi (Dardanelles, strait).....	A 3	Gömbö.....	C 4	Kiliet.....	J 4
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Amasya, 32,345.....	F 2	Çarlık.....	C 4	Günay.....	C 3	Kirali.....	D 4
Anadolü.....	C 2	Çarşamba.....	G 2	Günnük.....	C 4	Kirkagac.....	B 2
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Antalya Körfezi (Gulf of Adalia).....	D 4	Ceyhan.....	F 4	Harancik.....	H 3	Kob.....	E 3
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Ardahan.....	K 2	Cine.....	C 4	Hebeli Ada (island).....	D 6	Küçükköy.....	D 6
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Arpaçay.....	K 2	Çokören.....	F 4	Hoyran Gölü (lake).....	H 3	Küllük.....	B 4
Arsoz.....	G 4	Çorlu.....	B 2	Hüseyinabat.....	F 4	Kumkalesi.....	B 6
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Avisin.....	H 3	Daday.....	E 2	İlgin.....	E 4	Lice.....	J 3
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Ayvaciik.....	E 4	Darende.....	G 3	İnegöl.....	F 2	Malkara.....	B 2
Ayviliik.....	B 3	Demirci Çal.....	C 4	İnhisar.....	D 3	Mamhatun.....	J 3
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Bandırma.....	B 2	Dürtmen Dagı (mt.).....	F 2	Izmir (Smyrna), 286,015.....	B 3	Melen.....	D 2
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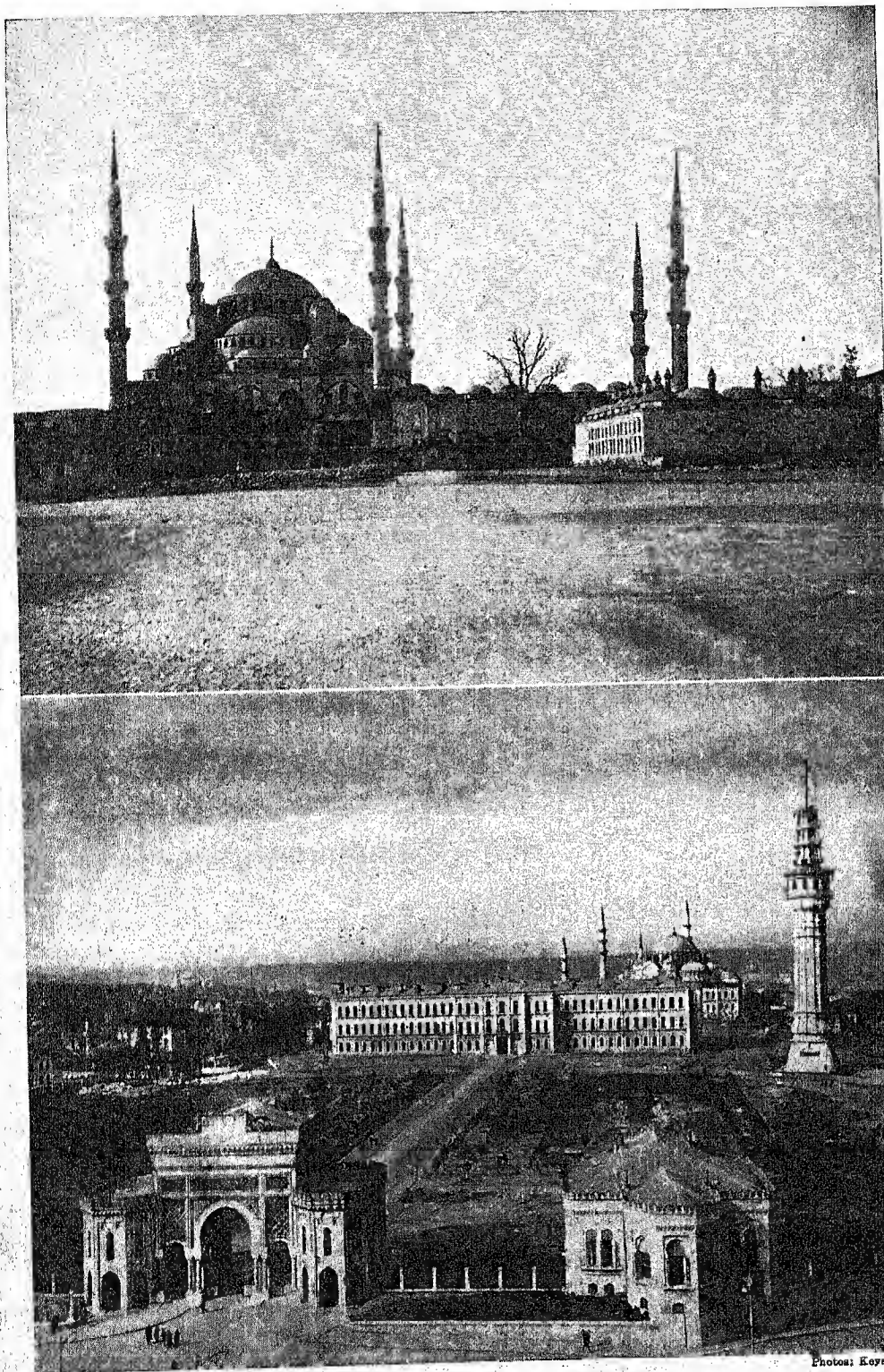


TURKEY Continued

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Ortaköy.....	F 3	Sedd el Bahr.....	B 6	Sultaniye.....	E 4	Üsküdar.....	C 2
Osmancik.....	F 2	Selendi.....	C 3	Sungurlu.....	F 2	Üsküp.....	B 2
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Pozanti.....	F 4	Sile.....	C 2	Tekirdag, 48,559.....	B 2	Yabanabat.....	E 2
Prinkipo.....	D 6	Silifke.....	E 4	Temre.....	D 4	Yalvac.....	D 3
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Salmanli.....	F 3	Sis.....	F 4	Türkmen Dagı (mt.).....	D 3	Zara.....	G 3
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Saphane.....	C 3	Söğüt.....	C 2	Ula.....	C 4	Zivarik.....	E 3
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SYRIA and LEBANON

DJEBEL DRUZE		Djounieh.....	F 5	Damas (Damascus, capi- tal), 200,000.....	G 6	Khabour (river).....	J 5
Djeb Druze (mts.).....	G 6	Liban (mts.).....	F 6	Deir ez Zor, 6,659.....	H 5	Khan-abou-Chamate.....	G 6
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Massiaf.....	G 5	Abou Douhour.....	G 5	Douma.....	C 6	Qouneitra.....	G 6
Quadmous.....	F 5	Abou Kémal.....	J 5	El Bab.....	C 4	Qtaife.....	G 6
Safita.....	G 5	Alep (Aleppo), 300,000.....	G 4	El Kom.....	H 5	Racqé.....	H 5
Tartous.....	F 5	Anti Liban (mts.).....	G 5	Esrive.....	G 5	Rasafé.....	H 5
Tell Kalath.....	G 5	Bir Bahadje.....	J 4	Euphrates (river).....	H 4	Sabkha.....	H 5
LEBANON		Bir Bidéz.....	J 4	Fadghami.....	J 5	Salahiye.....	J 5
Amioun.....	F 5	Bir Beimeane.....	H 4	Gabagub.....	H 5	Seleimiye.....	G 5
Baalbek, 4,500.....	G 5	Bir Choueane.....	H 4	Hama, 45,000.....	G 3	Souar.....	J 5
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Beyrouth (capital), 150,000.....	F 6	Chelkh Meskine.....	G 6	Hassetché.....	J 4	Tell Abian.....	H 4
		Chmetéyé.....	H 5	Hassle.....	G 5	Tell Kotchek.....	J 4
				Homs, 70,000.....	G 5		
				Idlib, 20,000.....	G 5		



In Constantinople. Above, the Sultan Achmed Mosque, the largest structure of the kind in a city of mosques. Below, in the background, the new University of Law and Letters, a modern structure. The entrance gate is at the roadside.

Photos: Keystone

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Under the leadership of Mustapha Kemal, a National Congress met at Erzerum in 1919. In 1920 the Parliament at Constantinople signed the National Pact, in which Turkey first declared its rights to Anatolia, Eastern Thrace, and Mosul; asked that the foreign privileges be abolished; and agreed to the internationalization of the Straits. In 1920 the Allies forcibly occupied Constantinople, and, although they had agreed to recognize the Nationalist Parliament if it met in Constantinople, the British forces arrested its representatives. Those who escaped fled to Ankara, where the Parliament was reconvened and

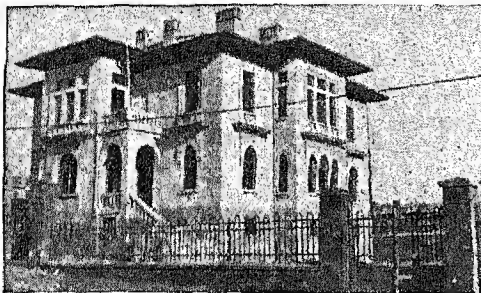


Photo: O R O G

THE AMERICAN EMBASSY AT ANGORA (ANKARA)

Mustapha Kemal was elected President. From 1920 to 1922, Asia Minor was under the government of the Assembly, while the sultan's government was effective only in Constantinople and the area around it.

The Treaty of Sèvres, which was signed by the sultan's emissaries in 1920, gave most of Eastern Thrace and Smyrna and the surrounding area provisionally to Greece, and mapped out spheres of French and Italian influence in Anatolia. All Turkey raged when this treaty was signed; even in Constantinople the shops were closed and prayers were said for the country. In Anatolia the Nationalists took on new courage. Early in 1921, Turkey and Russia signed a treaty of friendship, and Russia was the first to recognize the Nationalist government in Ankara. A change of government in Greece, by which King Constantine was returned to power, and the continued defeats of the Greek troops, caused the sympathies of the Allies with Greece to wane. It became quite evident that the Treaty of Sèvres would have to be recast, and unsuccessful attempts were made in the direction of agreements with Italy and France. New Greek offensives, begun in July, 1921, were defeated by Mustapha Kemal and his forces, and he was awarded the title *Ghazi* (Conqueror) by the National Assembly. In October, 1921, France made a separate treaty with the Nationalists, withdrew from Cilicia, and retroceded to Turkey a strip of territory along the Syrian

border. The Greek forces were defeated in 1922 in a Turkish offensive (see SMYRNA), an armistice with the Allies was signed, and the peace conference at Lausanne was opened.

Formation of the Republic. In November, 1922, the National Assembly abolished the sultanate, and the caliphate, or spiritual authority, was offered to Abdul Mejid Effendi, cousin of the deposed sultan. A year later, the caliphate, so long the symbol of Turkey's spiritual leadership of the Moslem world, was cast aside, and Turkey began a thorough course of secularization of schools, courts, laws, and customs. Turkey was declared a republic, Mustapha Kemal was elected President by the Assembly, and Ankara took the place of Constantinople as the official capital.

Turkey's relations with the European powers were settled at Lausanne (see LAUSANNE, TREATY OF), Turkey winning its demands on all points save the Mosul question. That was not settled until December, 1925, when the Council of the League of Nations decided that the Mosul area should remain a part of Iraq and under British mandate; Turkey, however, was to derive a ten per cent profit from the oil wells of Iraq during the twenty-five years of the British mandate. Another important provision had to do with exchange of population. It was very evident to Turkey that a condition of many races under one government was not conducive to the peace and prosperity of a country—especially a new one. To avoid this, and to achieve the nearest approach to national unity, the Orthodox Greeks in the new Turkey were exchanged for Moslem Turks in Greece. All Christians, including Greeks, were allowed to remain in Constantinople and enjoy the same rights and privileges accorded other minorities in Europe. The exchange of people, of course, had its unfortunate aspect, for many were compelled to leave homes occupied by their forefathers for many generations, and to seek new ones in a strange land. Although by the treaty Turkey lost much territory, what remains is entirely Turkish; there is no "lost Turkey" to regain by subsequent wars, and the Turks are left to work out their own destiny.

The New Turkey. One of the most complete transformations recorded in history has been wrought in Turkey since the close of the World War. An abrupt severance from everything that symbolized the past has been made, and the keynote of all the changes is Westernization. The fez, the veils for women, turbans, polygamy, and harems—all reminiscent of a decayed civilization—have gone; and in their place have come European headwear and new marriage and inheritance laws. No longer may a man divorce his wife by dropping three pebbles and repeating a few words. Another fundamental change was the secularization of

OUTLINE AND QUESTIONS ON TURKEY

Outline

I. Location and Size

- (1) Largest part in Asia
- (2) Small portions in Europe
 - (a) Part of greatest importance
- (3) Total area

II. The Land and Its Resources

- (1) Physical features
- (2) Climate
- (3) Agriculture and Mining
 - (a) Products
- (4) Industries
 - (a) Exports

III. The People

- (1) Races
- (2) Former condition of people
- (3) Change in nationalities
- (4) Social life
- (5) Religion
- (6) Education
- (7) The cities

IV. Transportation

- (1) Railways

V. Government

- (1) Former government
 - (a) In theory—a limited monarchy
 - (b) In practice—intolerant autocracy
- (2) Government under the republic
 - (a) Assembly
 - (b) President and Cabinet

VI. History

- (1) Empire in Europe founded
 - (a) Fall of Constantinople
 - (b) Later conquests
- (2) Conflict with Russia
 - (a) Crimea surrendered
 - (b) Eastern question
 - (c) Crimean War
 - (d) Russo-Turkish Wars
- (3) Internal struggles
- (4) Balkan Wars
 - (a) Great loss of territory
- (5) World War
- (6) Reorganization

Questions

Who founded the former capital of Turkey? What part has it played in history? Where is the Levant? What does the name mean? For what is it famous? (See LEVANT.)

What changes in territory occurred between 1914 and 1919? What is the present extent of Turkey?

Why were the powers so desirous of a partition of Turkey?

Why should an American desiring to learn the Turkish language now find his task comparatively easy?

Explain the meaning of *Sublime Porte*.

What important changes in dress have recently been made in Turkey?

Describe the educational system of the republic, and state several ways in which it differs from the old.

Why may Turkey no longer be called "the Sick Man of Europe"?

Explain why non-Turkish nationalities were sent out of Turkey and exchanged for Turks living in other countries.

How has Ankara solved the traffic problem? Describe other changes made to modernize the city.

Name the principal agricultural products of Turkey. What important new product has been introduced?

Describe the activities of the Young Turks.

What Turkish leader was mainly responsible for the Westernization of his country? What position did he hold in the new republic?

How has the social and political status of women in Turkey been affected by recent events?

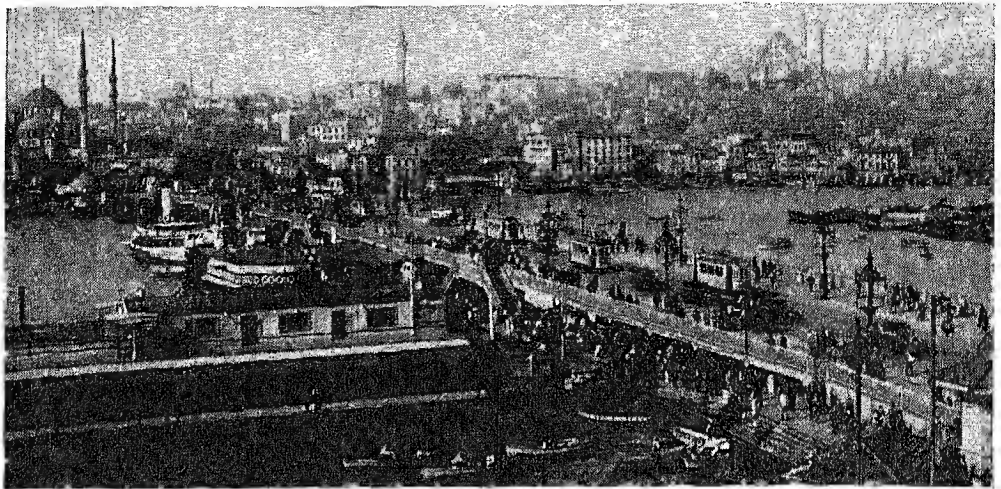


Photo: Aemo

THE SKYLINE OF ISTANBUL IS PIERCED BY MINARETS

laws and schools. Formerly, the Koran was the book of law as well as religion, and many unfair advantages and privileges were granted to "believers."

In 1928 a law was passed which ordered the abandonment of the Arabic alphabet, and promulgated a new Turkish alphabet, based on the Latin characters of the Western languages. Up to that date, the Arabic alphabet had been used. It was originally adopted when the Mohammedan religion was accepted, for the purpose of linking together the Mohammedan civilizations. For a similar reason, the Latin alphabet has been adopted, for, more than anything else, Turkey now is eager to become Westernized. The Western alphabet will not only make the Turkish language easier for the Turk to master, but also make it easier for the American, Frenchman, or Englishman to learn. The new alphabet has only twenty-seven letters, as compared with the hundred and twenty-seven of the old. Turkish sounds, moreover, are much more readily expressed through the vowels of the Latin letters.

So revolutionary a change cost the government more than \$3,000,000 during the first few months of enforcement. School books had to be translated into the new characters, newspaper equipment had to be changed, with resulting loss of circulation, all public signs were remade, and all periodicals set with the new symbols. Free public lectures, night classes, and free literature have been provided, to teach all who desire to learn.

The twenty-four-hour day, beginning at midnight, the Gregorian calendar, and the metric system of weights and measures were adopted. A friendly treaty between Soviet Russia and Turkey was signed in 1925, and an ambassador was sent to China in 1927. The first ambassador from the United States to the

new republic went to Turkey late in 1927.

In 1932, Persia ceded to Turkey the eastern, or Persian side of Mount Ararat, in return for two tracts of land along the southern frontier of Turkey. In February, 1934, Turkey signed the Balkan Pact, a ten-year nonaggression treaty with Rumania, Greece, and Yugoslavia.

In 1934 a law was passed requiring every one to add a family name to his personal name by 1936; Mustapha Kemal became Kemal Ataturk. All titles other than official were abolished. In 1938, Kemal Ataturk died, and was succeeded by Ismet Inonu, unanimously elected to the presidency.

As master of the Dardanelles (which see) at the outbreak of World War II, and shortly thereafter as a nonbelligerent ally of Great Britain, Turkey's international relations were further complicated by the necessity for close co-operation with Russia and its strategic position in relation to the Suez Canal. The country, however, maintained neutrality. J.F.McK.

Related Subjects. The reader is referred to:

GEOGRAPHICAL TOPICS

Anatolia	Levant
Asia Minor	Marmora, Sea of
Bosporus	Smyrna
Constantinople	Taurus

HISTORY

Abdul-Hamid II	Lausanne, Treaty of
Balkan Wars	Mohammed V
Berlin, Congress of	Mohammedanism
Byzantine Empire	Russo-Turkish Wars
Caliph and Caliphate	Seljuks
Crimea (Crimean War)	Sèvres, Treaty of
Dardanelles	Solyman II
Gallipoli	Thrace
Hejaz	Troy
Iraq	Turks
Kemal, Mustapha	World War I, II

LEADING PRODUCTS

Carpets and Rugs	Fig
Cotton	Meerschaum
Date and the Date	Mohair
Palm	Tobacco

TURKEY, one of a group of game birds related to the pheasants and native to North America. There are but two species—the ocellated turkey of Central America, a small



DOMESTIC TURKEY

Photo: Lambert

brilliantly colored bird with eyeline spots on the tail coverts; and the wild turkeys of Mexico and the United States, represented by five subspecies. The wild turkey of Southern Mexico is the breed from which the domesticated turkey of the poultry yard is derived—the turkey that finds a place on the dinner table at Thanksgiving time and at Christmas.

The common wild turkey was once abundant as far north as Maine and Southern Ontario, and was the noblest game bird in America. Unfortunately, it is much less common than formerly. The adult male is about four feet long, and is clothed in handsome plumage with metallic-green, copper, and bronze reflections. The body feathers are tipped with black, and the tail and upper tail coverts with chestnut. There are fourteen to eighteen feathers in the tail. A long tuft of bristle-like feathers hangs from the center of the breast, the legs are spurred, and wattles are found on the head and neck, which are bare of feathers. The female is smaller and has duller plumage, and she lacks the tuft of bristles.

In their native haunts in the forests, these turkeys congregate in small flocks, coming into the open only to secure food. They are fond of nuts, seeds, insects, berries, and other small fruits. At night they roost in the trees. The crude nests, lined with dry leaves, are placed on the ground.

Turkey eggs are about twice as large as those of the common fowl, and are pale cream-buff, speckled with brown.

The breeding of turkeys is an important item in the American poultry business, though the number of turkeys raised is much less than the number of chickens, because the eggs of the latter are more valuable and there is greater demand for the smaller fowl. Turkey flesh is nutritious, of delicious flavor, and easily digested, but is too expensive to be as common an item in the diet as chicken. The largest and most popular of the domestic varieties is the *bronze turkey*, which shows its descent from the wild turkey of Southern Mexico by the copperish-bronze sheen in some parts of the plumage. The cocks may reach a weight of thirty-six to forty pounds.

Turkeys require much the same care as chickens (see **POULTRY**), but are more dependent on having a wide range, and are more delicate, especially when young. The hen usually produces a brood of about twelve, and but one brood a year, unless she loses the first hatching. Because the cock is disposed to break her eggs, a turkey hen is very ingenious about finding hiding places for her nest. Turkey-raising is also carried on in Europe, the first birds having been carried over from America in the sixteenth century. The turkey is the only domesticated fowl native to America. See **BIRDS** (color plate, Game Birds). D.L.

Scientific Names. Turkeys belong to the family *Meleagridae*. The ocellated turkey, noted for its green tail-feather spots, is *Agriocharis ocellata*; the wild turkey is *M. gallopavo*. The Southern Mexican form is *M. mexicana*.

TURKEY BUZZARD, OR TURKEY VULTURE, the most common of American vul-

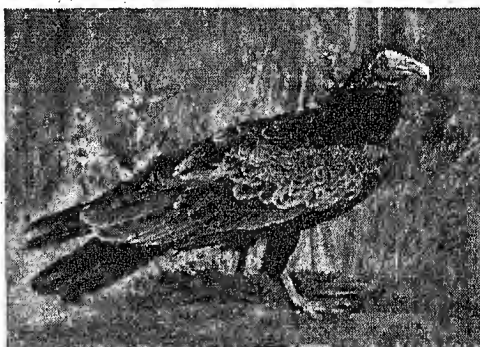


Photo: Visual Education Service

THE TURKEY BUZZARD

tures (see **VULTURE**). It has glossy black plumage edged with grayish-brown, and a bright red head and neck. It is about thirty inches long, with a wing breadth of six feet, and can be distinguished at a distance by the upturned ends of its wings. In common with other vultures, the turkey buzzard has the disgusting habit of gorging itself on the decomposing flesh of dead animals, and, when disturbed, of ejecting the mass before it attempts to fly. It is considered of



TURKOMAN AND NEIGHBORING SOVIETS

value as a scavenger. It nests in hollow stumps or logs, or on the ground under palmettos or bushes. The two handsome eggs are of a creamy color, mottled with reddish-brown or chocolate. These vultures range from Canada to Mexico. They may often be seen soaring high in the air, without moving a wing. D.L.

Scientific Name. The turkey buzzard belongs to the family *Cathartidae*, and is *Cathartes aura*.

TURKEY RED, a dye. See **MADDER**.

TURKEY RIVER. See **IOWA** (Rivers and Lakes).

TURKEY-TROT. See **DANCING** (Sensational Dances).

TURKEY VULTURE. See **TURKEY BUZZARD**.

TURKISH BATH. See **BATHS AND BATHING**, subhead.

TURKISH DRUM. See **DRUM** (Bass Drum).

TURKMENISTAN. See **TURKOMAN SOVIET SOCIALIST REPUBLIC**.

TURKOMAN SOVIET SOCIALIST REPUBLIC, also known as **TURKMENISTAN**, is one of the constituent republics of Soviet Central Asia, extending from the Caspian Sea to the Oxus River, and bounded on the north by Uzbek and Tadjik. It is made up of the former Trans-Caspian region, part of Bokhara, and part of Khiva. These divisions were united in 1924, when Russian Turkestan was partitioned along ethnic lines; in 1925 it entered the Union of Soviet Socialist Republics as an equal with the other ten constituent republics. See **RUSSIA**; **TURKESTAN**.

The country is peopled by nomadic, warlike tribes who have roamed the deserts and plains for many centuries. The population reported in the 1939 census was 1,254,000, of which number 245,300 live in towns. The people are principally Turkomans, Uzbeks, Russians, and Persians. The country, 171,384 square miles in extent, is mainly desert plains, with a moun-

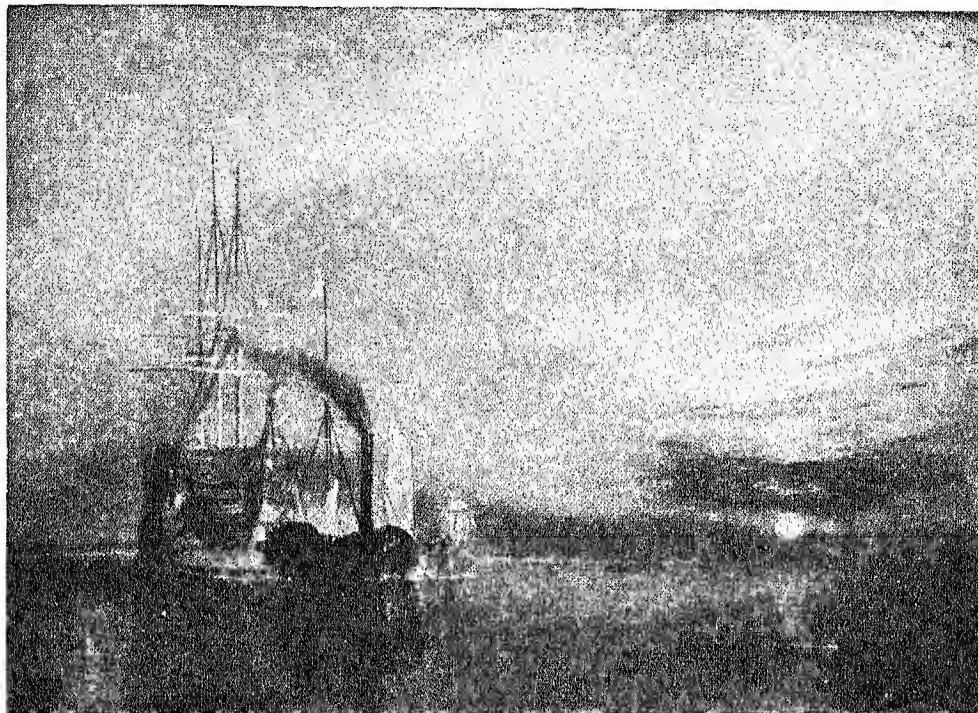
tainous region to the south. The climate is very dry, and cultivation is practically impossible without irrigation. Despite the nomadic nature of the people, agriculture is their main occupation, and wheat, rice, cotton, and fruit are produced, large sums having been spent on irrigation and the improvement of the land. Unreliable water supply and locusts sometimes play havoc with many of the crops. Watermelons and other fruits are raised, and silkworm breeding is important. In 1928 a large silk factory was built. Sheep and cattle are raised, and the Astrakhan fur from the sheep of this region is in great demand. It is also the home of a special breed of horses. The mineral resources include ozocerite, a waxlike mineral used in making candles; oil, sulphates, common salt, and sulphur.

Manufacturing has slowly increased as the country has overcome the chaos which followed World War I. Cotton- and wool-cleaning, brewing and distilling, glass manufacture, carpet-making, and fruit-drying are the chief industries. The Turkoman carpets, made in the homes of the natives, are famous. There are about 955 miles of railway, and a motor road, recently completed, provides communication across the mountain barrier which separates the republic and Persia. Airplane lines have been established, affording a striking contrast with the primitive mode of life prevalent in this country.

Ashkhabad, or Askabad, the capital, is a frontier town on the Akkal oasis. It is attractively laid out, and has wide streets and beautiful trees. The manufacturing plants include cotton mills, tanneries, and brick works. The Trans-Caspian Railroad provides transportation, and a recently constructed electric-power plant offers additional inducements to industries. Population, 1,265,580 (1939). A.P.

Related Subjects. For additional information, the reader is referred to the following articles:

Russia (Size and Location)	Turkestan Turks	Uzbek World War I
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"THE FIGHTING TÉMÉRAIRE"

A reproduction of one of Turner's most famous paintings.

TURKO-TATARS, *tah' tahrz*. See **RUSSIA** (The People).

TURKS, in a broad sense, the name of the Mohammedan subjects of the former Ottoman Empire, now the National State of Turkey. The name is applied more specifically to the Osmanli, or western Turks, who were conquerors of Constantinople, and to the inhabitants of the region in Asia known as Turkey. There are various other peoples, however, who belong to the same group linguistically; that is, who speak Turkish (or Turkic) languages. These include the Russian Tatars (or Tartars), the Turkoman tribes living between the Caspian Sea and the Oxus River (in Central Asia), the Kirghiz, the Siberian Tatars, and other nomadic tribes of Asia. There are also Turks in the Crimea, in the Caucasus, and along the Volga.

Related Subjects. The reader is referred in these volumes to the following articles:

Kirghiz Seljuks Tartars Turkey

TURMERIC, *tur' mur ik*, a plant native to Southern Asia, the fleshy rhizomes (roots) of which are the source of a substance, also called turmeric, which is used mainly for dyeing. The plant belongs to the ginger family, and is known botanically as *Curcuma longa*. Its rhizomes are hard and tough; externally, they

are brownish or yellowish-green, but when broken show a resinous interior which varies from orange-brown to deep reddish-brown. The roots are prepared for the market by being cleaned, boiled for some hours, and then dried in an oven. The yellowish powder which they yield when ground has a strong, aromatic odor and a strong, pungent taste.

Turmeric has been used for centuries as a dyestuff and as a condiment, and it is an important ingredient of curry powder. It does not yield a fast color, however, as a dyestuff. It has gone out of use as a medicine, but in India it forms, when mixed with milk, a cooling lotion for the skin and eyes. Turmeric is useful in chemistry in making test papers for alkalies, for on the addition of alkali, white paper soaked in a tincture of turmeric turns to reddish-brown, and on drying, to violet. See **DYEING AND DYE STUFFS**. G.M.S.

TURNER, JOSEPH MALLORD WILLIAM (1775-1851), an English painter, considered by many competent critics to be the greatest artist of the English school of landscape painting. Public appreciation of his work has been decidedly affected by Ruskin's praise of it in *Modern Painters*, though Turner won high honors in his day. His father, a London barber, native of Devonshire, recognized the boy's talent, and encouraged it in every way possible.

He taught his son to read, permitted him to neglect regular schooling for art study, and had him enter the Royal Academy in 1789. The next year, when Turner was but fifteen years old, he exhibited his first picture, a view of Lambeth Palace.

During his period of development, which continued until about 1800, he made designs for magazine prints, mastered the technique of water-color painting, and became known as one of the promising landscape artists of the day. About 1802, the year of his election to membership in the Royal Academy, he began to paint in oils, and during the next fifty years exhibited nearly 200 pictures at that institution. When he died, he bequeathed his valuable collection of paintings, engravings, and sketches to the nation, and this collection may be seen to-day in Turner Gallery, occupying two rooms of the National Gallery in Trafalgar Square, London.

Turner was a devoted student of nature, and to obtain material for his pictures, he was accustomed to go away alone on sketching tours, through England, France, Switzerland, and Italy. He depicted natural scenes with the brush of an idealist, not a realist, and his work has a high poetic quality that Ruskin calls "the Turnerian mystery." He used light and color in such a way as to create an effect of indistinctness, and at the same time his coloring was striking, even brilliant. Unfortunately, he did not fully understand how to mix oil colors, and some of his finest works have greatly deteriorated. As a master of water color, however, he has never had an equal, and in etching and engraving, he ranks with the best.

Turner died in a lodging at Chelsea, where he had sought seclusion in ill health, being known to the children of the neighborhood as "Admiral Booth," from his sailor-like figure and the known name of his landlady. He was buried in Saint Paul's Cathedral, and left a large fortune for the support of impoverished artists.

Representative Works. There are numerous Turner collections in America, and one may see good examples of his work in the Metropolitan Museum and the New York Public Library. His *Grand Canal, Venice*, which is admired for its beautiful treatment of sky and water, and *The Castle of Indolence*, are in the Metropolitan collection. The Boston Museum possesses his *Slave Ship*, and the New York Public

Library his *Staffa, Fingal's Cave*. His most popular picture, *The Fighting Temeraire*, shown without color on page 7319, is in the Turner collection of the National Gallery. It was exhibited in the Royal Academy in 1839. Other famous works are *Shipwreck, Sun Rising in the Mist, Bay of Baiae*, and *The Splügen*, which depicts the grandeur of Alpine scenery.

TURNIP, a common biennial plant of the mustard family, cultivated in gardens and fields for its fleshy root, which is used as a table and stock food. There are numerous varieties of turnips, and their roots vary considerably in shape. Some are elongated, some are round, others are broadened out, and some are spindle-shaped. The flesh is whitish or yellowish. Garden varieties are usually smaller and of more delicate flavor than field varieties. If the roots are desired for early summer use, the seed must be sown in the spring as soon as the ground can be worked, but planting for winter turnips need not take place until the middle of July, or even later. In the cultivation of garden turnips, the seeds are sown in shallow drills fifteen inches or more apart, and the plants are thinned until they are from four to six inches apart in the row. In field culture, the seed may be sown broadcast, or in drills two or two and a half feet apart. Careful hoeing is essential.

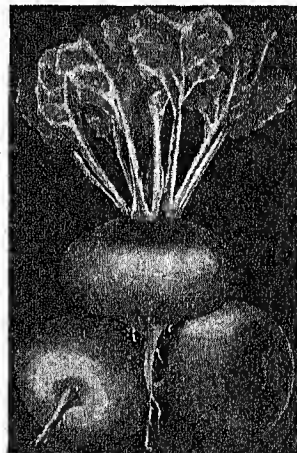
The roots will have a sweeter flavor if not dug until they have had a touch of frost, but severe freezing will spoil them. They may be stored for winter use in damp earth, sand, or leaves, but a cellar with earth walls and floor makes a good storage house. If piled in heaps on the floor and covered with earth, they will keep indefinitely. The tops in all cases must be removed. Turnips are about nine-tenths water and have a low percentage of nutriment, but they can be cooked and served in an appetizing way, and they give variety to a meal. Large quantities of field turnips are fed to stock in Great Britain, Europe, and Canada, and to some extent in the United States. The tender growing tops are sometimes used in spring as a green vegetable.

A species known as the *Swedish turnip*, or *rutabaga*, has a large root of firm flesh, pro-



Photo: Brown Bros.

J. M. W. TURNER



TURNIPS

Fleshy roots and tops.

nounced flavor, and yellow color. The rutabaga is used as a stock food more extensively than the ordinary turnip; sheep especially prefer it.

B.M.D.

Scientific Names. Turnips belong to the family *Cruciferae*. The common turnip is *Brassica rapa*; the rutabaga is *B. campestris*.

TURNSTONE, the name applied to two small species of shore birds, with reference to their habit of turning over shells and pebbles

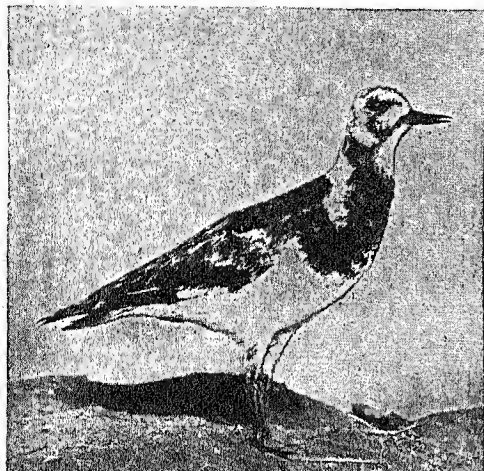


Photo: Visual Education Service

THE TURNSTONE

with their bills, in search of food. The common turnstone nests only in Arctic regions and migrates in winter to far southern shores, reaching the coasts of the Eastern United States in its migrations. It is a bird about nine inches long, with variegated plumage of black, white, and reddish-brown. The turnstone of the North Pacific coasts is similar, but lacks the reddish color in the plumage. These birds lay four olive-green eggs in secluded nests near shore.

D.L.

Scientific Names. The turnstones are related to the plovers and belong to the family *Aphrisidae*. The common turnstone is *Arenaria interpres*; the Pacific species, *A. melanocephala*.

TURNVEREIN, *toorn' fehr ine*, a name given to the athletic organizations established in Germany, about the beginning of the nineteenth century, by Friedrich Ludwig Jahn, and later to similar organizations in America. The organizations proved popular after the Napoleonic wars, and their membership rapidly increased. They had an enormous influence in building up a vigorous and hardy generation. The first societies in the United States were formed in Philadelphia and Cincinnati in 1848 by German refugees, and such societies are now to be found in America in most large centers of German population. The membership in America is about 40,000.

Friedrich Ludwig Jahn, *yahn* (1778-1852), was known as "Father Jahn" among his school children. These he gathered about him on holidays in Berlin, to play games, until their numbers grew so large that he built an outdoor gymnasium, of which the modern turnverein is the outgrowth. In 1809 he began teaching in Berlin; there he tried to develop harmony and kindle a public spirit among his pupils in their games. His efforts resulted in the establishment of gymnasiums, not only in Berlin, but in many other cities of Germany. In 1819, as a result of his agitation in favor of German national independence, Jahn was arrested, and later forced to live in seclusion for over twenty years. When Frederick William IV of Prussia ascended the throne, he decorated Jahn with the Iron Cross and gave him his liberty, but he died in comparative poverty and obscurity in Freyburg, where a turnhalle, or school of gymnastics, has been erected over his grave. See *PHYSICAL EDUCATION (Development Through the Centuries)*.

TURPENTINE. The fluid we buy in the paint store as turpentine is, correctly speaking, oil, or spirits, of turpentine, a substance obtained by distilling the real turpentine. Turpentine is the resinous sap of various species of pine. It is a thick, gummy substance, obtained from the trees in much the same way that maple sap is secured from maple trees. The bark is cut away with a special tool, and the sap is collected in metal cups. It is then boiled in a copper vat, the heat causing the turpentine to change into vapor; the vapor passes into a coil of pipe cooled by water, and is there condensed into oil, or spirits, of turpentine. The part left in the vat forms the resin of commerce (see *ROSIN*). Since the spirits of turpentine will ooze through ordinary wooden barrels, special containers are used for the product, the insides being coated with glue. When this hardens, it holds the oil perfectly.

Oil of turpentine is a yellowish, highly inflammable substance, of strong, peculiar odor and hot, biting taste. It is extensively used as a drying medium in paints and varnishes, for it solidifies when exposed to air. It will dissolve paint stains on clothing. This oil is also coming into general use as a solvent for rubber and other gums in the manufacture of artificial camphor, from which plastics such as celluloid are made.

Medicinally, oil of turpentine is used externally and internally. As purchased for such purposes, it is a purified substance called *rectified spirits of turpentine*. In the form of a liniment, it is used for sprains or strains, while the oil itself is applied externally in pleurisy and bronchitis. Mixed with injections in the intestines, it materially assists in the expelling of wind or gas. It is an efficient worm-expelling remedy, and is used also for ulceration of the stomach and intestines. In typhoid fever, it acts favorably, assisting to heal the ulcerations of the bowel, which are characteristic of this fever, and aiding also in the expulsion of gas. In certain forms of urinary difficulties depending

on relaxed kidneys, it exerts a stimulating, contracting influence which is helpful in relieving the difficulty. Like all other medicinal agents, spirits of turpentine should not be taken except on a physician's prescription.

The chief sources of turpentine in the United States are the long-leaf yellow pine (*Pinus palustris*) and the slash pine (*Pinus heterophylla*) of the Southern states. A small quantity of wood turpentine is obtained by distilling pinewood. *Spruce turpentine*, a by-product in the manufacture of paper, has been made to produce dyes by means of chemical processes worked out at the University of North Carolina. See PINE: G.M.S.

TURQUINO, *toor ke' no*, a peak in Cuba. See CUBA (Physical Features).

TURQUOISE, *tur' koiz*, or *tur'-kwoiz*, a beautiful, semi-precious stone of delicate green or blue shades. The color most prized is the robin's-egg blue. In chemical composition, the turquoise is commonly regarded as a hydrous phosphate of aluminum, and the color is due to the presence of copper or perhaps iron phosphate. Chemists do not altogether agree on these points. When the stone is heated, moisture escapes and the color becomes lighter. From this phenomenon arose the superstition that the fading of the color was a sign of misfortune. The turquoise is the national stone of Persia, and it is much admired by Orientals, who believe that it possesses healing power.

The stone is found in igneous and volcanic rocks in Mexico, in New Mexico, Colorado, Arizona, Nevada, and California, and in Persia, Asia Minor, Turkestan, and Siberia. The mines in Persia have been worked for at least 800 years, and produce the finest kinds. Fossil bone, colored blue by phosphate of iron, which is called *odontolite*, or *bone turquoise*, looks very

much like turquoise, but the two can be easily distinguished when seen under a microscope. The turquoise is the birthstone for December. See BIRTHSTONES; GEMS; and next page. T.B.J.

TURRET, a term derived from an old French word meaning *little tower*, applied in architecture to a small circular or equiangular structure at the corner of a larger building, and in ancient days to a tall, movable structure, usually on

wheels, bearing soldiers and military devices for scaling or battering the walls of a besieged castle or town. (See CASTLE.) In modern naval and military usage, a turret is a heavily armored, towerlike structure, usually revolving by machinery, formounting and protecting guns, fired from the inside. In modern naval vessels, turret mountings are built into the ship to receive heavy guns—those of over six-inch caliber (over eight-inch in the United States navy). These heavy guns form the primary batteries of modern battleships and battle cruisers. Both turrets and guns are worked by power, either hydraulic or electric.

The *Monitor*, built by John Ericsson in 1862, was the first warship equipped with a practical turret, and turreted ships were long called *monitors*, after that famous vessel. [See WAR OF SECESSION (Monitor and Merrimac).] Naval turrets are sometimes double, one superimposed on the other, and even triple, each revolving independently; a triple turret may weigh over 1,000 tons. In the design of naval turrets, it is necessary to provide for the recoil of heavy guns when fired. This is accomplished by means of spring buffers or by the compression of air during the recoil.

Turret Lathe, in mechanics, the term applied to a lathe having a capstan head, called a *monitor* or *turret*, used as a holder for various tools and pivoted so as to revolve and present any of the tools to the work. See LATHE.



Photo: Visual Education Service

TAPPING PINE TREES FOR TURPENTINE

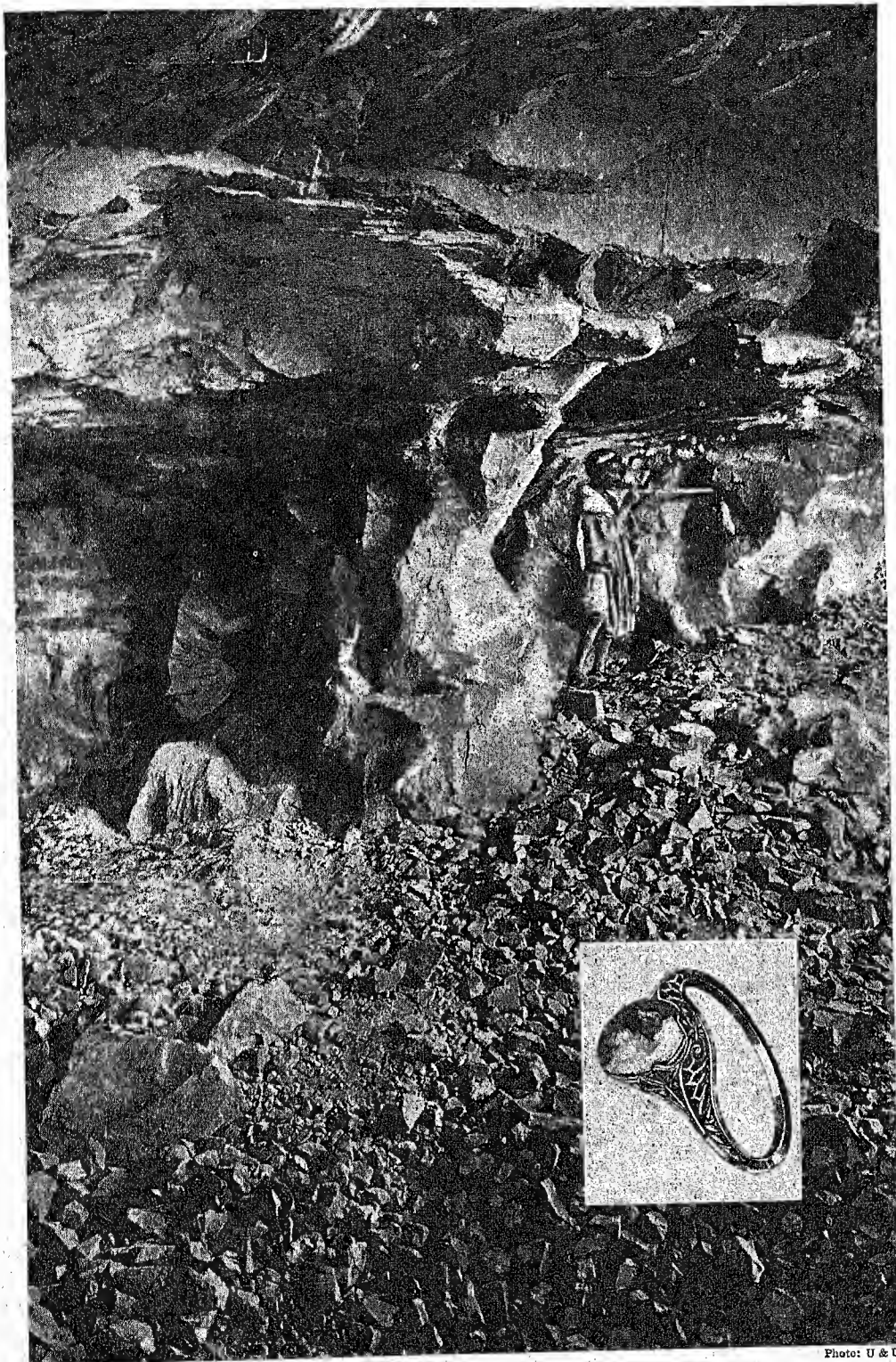


Photo: U & U

How Turquoise Is Obtained. The illustration shows the method employed in the Orient to secure turquoise from the rocks in which it is embedded. Inset shows a cut and polished stone set in a ring.

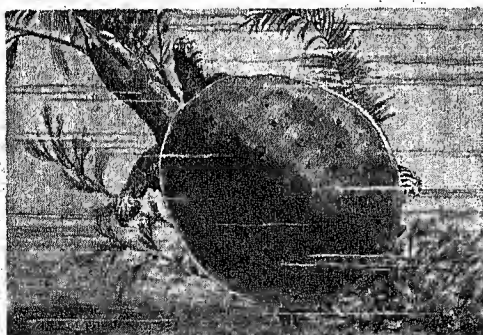


The sun bath

TURTLE. Among the many and varied devices that animals have acquired for protection against their enemies, none is more odd than the shell of the turtle tribe. A turtle always has a roof over him, for he carries his house with him wherever he goes. Says one zoölogist:

Were there no turtles living, we should look upon the fossil forms as among the strangest of all vertebrate animals—animals which have developed the habit of concealing themselves inside of their ribs, for that is literally what the turtles do.

The short, broad body of the turtle is covered above by the *carapace* and below by the *plastron*, which are joined in such a way that the head, limbs, and tail project through openings. The carapace consists of a series of bony skin plates, attached to and covering the backbone and dorsal ribs. The lower part is built



SOFT-SHELL TURTLE

around the breastbone and ventral ribs. In most species, horny shields or plates of varying pattern and arrangement cover the bony shell and help to identify the different families. One of the sea turtles, the leatherback, has a leathery coat all in one piece, instead of a hard shell in two sections. Still another variety is the soft-shelled turtle, representing a family of twenty-seven species. They have the characteristic carapace and plastron, but the horny

plates are lacking and the shell is soft and leathery.

The turtles constitute an order of legged reptiles of over 200 species. Some live wholly in water, some only on land, and others are fitted to live in either environment. Like other reptile groups, the turtles are found most abundantly in the tropics; the fresh-water forms are the most numerous. Scientists call the order *Chelonia*, but the names *turtle*, *tortoise*, and *terrapin* are commonly used to designate these reptiles. By some writers tortoise is reserved for strictly terrestrial species. Others use turtle and tortoise interchangeably for fresh-water species. Terrapin is applied rather loosely to various fresh-water turtles; it is used more especially for some of the edible species. Altogether, the chelonians form one of the most ancient reptile orders, and one that is unique in that no species, living or fossil, possesses teeth. The horny-edged jaws, however, are quite capable of biting hard substances, and some turtles can inflict serious wounds.

The adaptations of the turtles are most interesting. The land-dwellers are slow and clumsy, and need special protection from their enemies. The bones of the shell are closely united, and the head, legs, and tail can be withdrawn inside the shell when danger threatens. The plastron of the box tortoise (see subhead, below) has a hinge arrangement that permits him to close his shell up tight, by lifting the plastron to the carapace. Land tortoises have short, club-shaped feet with blunt claws, suitable for a terrestrial life and a peaceable existence. They feed chiefly on berries and vegetation, and by nature are docile.

Fresh-water turtles are more active than their land cousins, and have their feet partially or completely webbed, according to the amount of time they spend in the water. Many of them cannot withdraw the head, legs, and tail within the shell, but their quicker movements make up for the lack of this adaptation. Sea

turtles have paddle-shaped limbs, resembling those of whales. In some water species, the bones of the shell are not closely united, and the carapace usually is less arched than that of the tortoises, which need room for lung expansion. The water turtles, with their flatter shells, cannot breathe by expanding the ribs, but fill their lungs with air drawn in through the mouth. A supply of oxygen thus inhaled permits a turtle to stay under water for an hour or more, before coming up for air.

The chelonians all hatch from eggs, which are laid in holes scooped out by the female with her hind legs. These holes may be dug in a sandy beach, in soft ground, or even in the wood of a rotting log. The eggs are well covered, and are hatched by the sun, usually in about two months, although cold seasons may delay hatching for several months. Turtles are remarkable because of their ability to survive serious wounds and mutilations. The land tortoises, especially, live to great age. Specimens alive to-day show marks that indicate that they have lived for over 200 years. Turtles are prone to stay in the same locality for a lifetime, and the marine species go back each year to the same beach to breed. The eggs and flesh of some species are edible, and the horny covering of one of the sea turtles furnishes the prized "tortoise" shell of commerce. In temperate climates, turtles hibernate in mud through the winter. Some of the more interesting and important species are described in the paragraphs below.

Snapping Turtles. These include a family of large fresh-water turtles whose powerful, keen-edged jaws well equip them to fight and to capture their food. Three species are found in North America, and one in New Guinea. The *common snapping turtle* is found east of the Rocky Mountains, from Southern Canada to Ecuador. It frequents sluggish, muddy streams and marsh ponds, in which it feeds

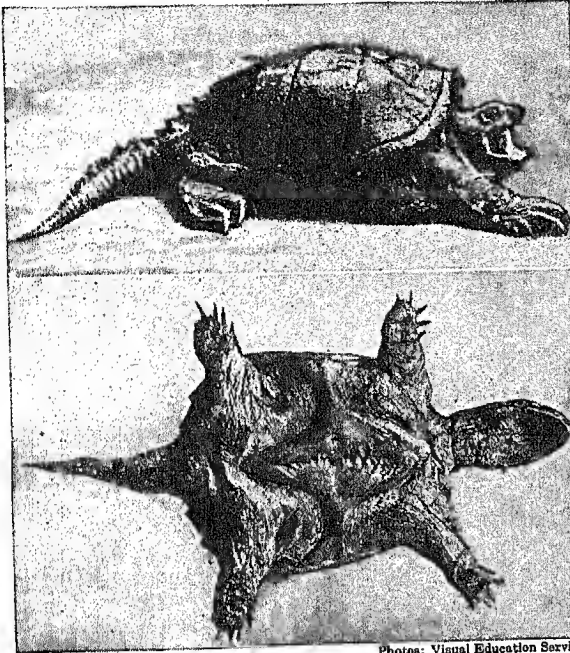
chiefly on fish, young waterfowl, and small aquatic animals. Sometimes the brown or olive carapace becomes wholly moss-covered, and the reptile then is easily mistaken for a stone in the mud. When attacked, it thrusts out a large, ugly head with the quickness of a snake, and its powerful jaws, which end in strong hooks, can inflict serious wounds. A good-sized specimen could easily snap off a man's hand. Old specimens are apt to grow

so fat that they are almost helpless on land, but these turtles usually do not leave the water, except to seize prey on the banks of pond or stream, or, in the case of the female, to lay eggs. The flesh of a fat snapping turtle is a choice article of food. Snapping turtles reach an average length of twenty-eight inches, of which the carapace takes up twelve inches and the fleshy tail eleven. The average weight is about thirty-two pounds.

The *alligator snapping turtle*, found in the lower Mississippi River and in the streams flowing into the Gulf of Mexico, is

the largest of North American turtles. Big specimens may reach a weight of 140 pounds. In appearance and habit, the alligator turtle is a larger edition of the common species, but is correspondingly more powerful.

Mud Turtles. Also known as musk turtles, because of their habit of giving out a musky odor when irritated, the mud turtles form a group of small aquatic chelonians with mud-colored shells. They are found in sluggish streams or muddy rivers, in which they are often a nuisance to fishermen, because they are prone to seize their bait. Though rarely as long as five inches, when molested they snap and bite as viciously as the bigger snapping turtles. Some of the mud turtles possess hinged lobes on the lower shell that enable them to draw up the plastron against the carapace, in much the same manner as the box turtles do. The species are widely distributed in North America.



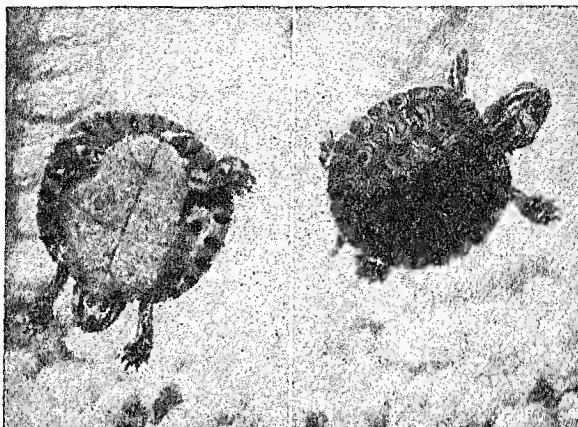
Photos: Visual Education Service

THE SNAPPING TURTLE

The lower picture shows the structure of the underside of the body.

Terrapin. This name has no exact scientific meaning. It is applied to various pond, salt-marsh, and river turtles of aquatic and semi-aquatic habit. Musk terrapin and mud terrapin are names used interchangeably with musk and mud turtle. In the United States, the name terrapin is more especially applied to the *painted*, *yellow-bellied*, and *diamond-back* terrapins and their allies. The painted terrapin, or *pond turtle*, is common in Eastern North America, especially in the Middle Atlantic states, and is easily recognized by its color markings. The carapace is dark olive, brown, or black, and is bordered with crimson, while the plastron is yellow and the head black and yellow. Red occurs on the neck and legs. This turtle is about six inches long, and when full grown weighs about a pound and a half. It always feeds under water, but likes to bask in the sun on a log.

The yellow-bellied terrapin is distinguished by its deeply grooved carapace, which is about



TERRAPIN

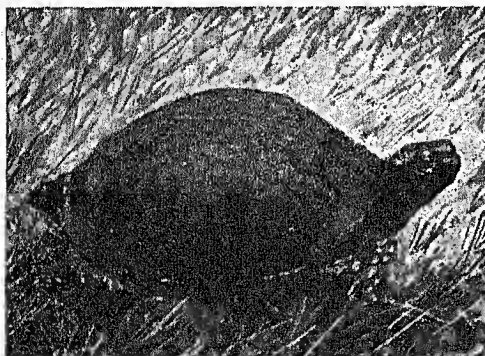


Photo: Visual Education Service

BOX TORTOISE

ten inches long. It is distributed from Virginia to Georgia, where it frequents stagnant pools and marshes. This species is sold in the markets, though its flesh is less esteemed than that of the diamond-back. The latter is so called from the peculiar formation of the shields on the olive-colored carapace. Average specimens have a shell between seven and eight inches long. Once common in the salt marshes of the Atlantic coast, the diamond-back has

become rare, but is sometimes propagated in enclosures, as its flesh is delicately flavored and in demand. It will not survive in water that does not contain salt.

Box Tortoise, or Box Turtle. These names are applied to a group of turtles that can shut themselves securely inside their shells. The carapace and plastron are joined by a piece of elastic cartilage, and the plastron is divided in the center by a hinge. When menaced, a box turtle can draw the front and back sections of the plastron up against the top shell, and conceal himself inside a box that is ex-

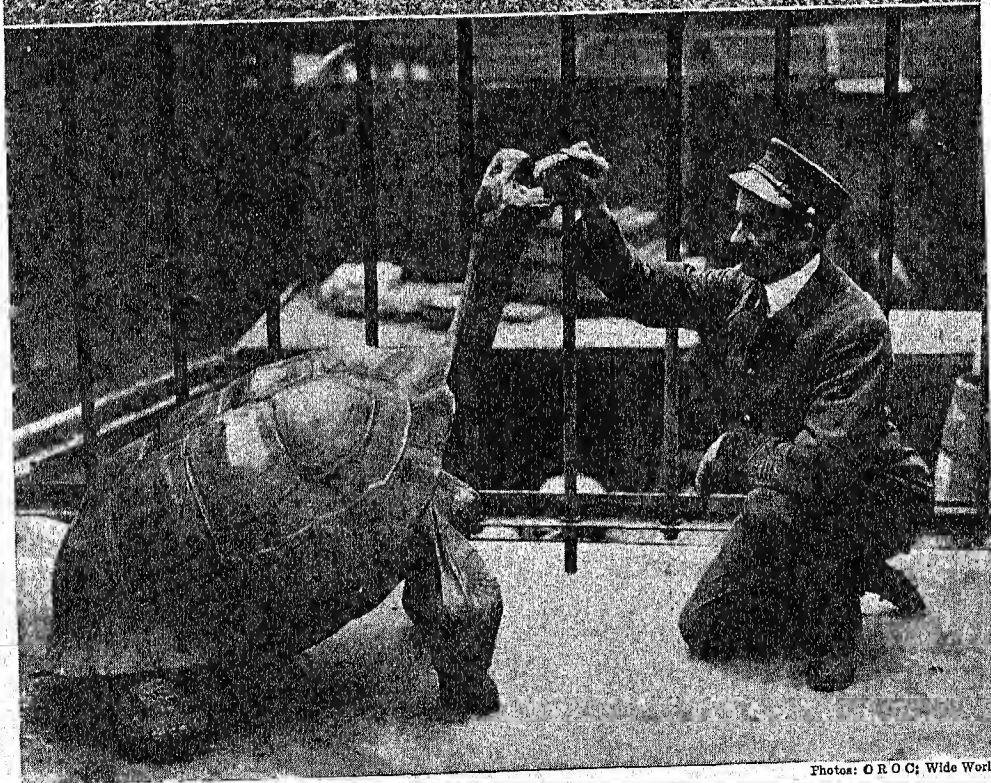
tremely difficult to pry apart. Structurally, these chelonians are allied to the water turtles, but since they are land-dwellers and are like the true tortoises in habit, they are called by both names.

The *common box turtle* is found from the New England states as far west as Kansas. Its carapace is between five and six inches long, and black or dark brown in color, with variable yellow markings. This turtle is a voracious eater of berries and vegetation, not disdaining earthworms and slugs, and it sometimes grows to be so fat that it cannot keep the two parts of the shell clasped together.

Tortoises of the Land. Comparatively few strictly land turtles are found in the western hemisphere, and only three species occur in the United States. They are dull-colored creatures and frequent dry regions. The best-known species is the *gopher tortoise*, which seeks concealment in an underground burrow, dug in sandy soil. Gopher tortoises are common in sandy barrens in the Southern states. The shell of average specimens is nearly a foot long; the carapace is strongly convex.

Among the tortoises, the largest are the giant tortoises of the Galapagos and some other oceanic islands. Their shells sometimes grow to be over four feet long, and specimens may weigh as much as 500 pounds. Many of these odd survivals of the age of reptile monsters are found in zoological museums, but in their island homes they are rapidly nearing extinction.

Sea Turtles. The sea turtles are found chiefly in tropical and subtropical oceans, and grow to large size, averaging three to six feet



Photos: O R O C; Wide World

Where Turtles Grow Large. Above, natives of the Samoan Islands return from a turtle hunt. Below, a tortoise from the Galapagos Islands, three hundred years old, now in the New York Zoological Park. He is the largest member of the turtle family in the United States. The keeper has learned that he has a fondness for bananas.

in length. The *leatherback*, mentioned earlier in this article, is gradually decreasing in numbers. At home in the warm parts of the Atlantic and Pacific, and in the Indian Ocean, it sometimes wanders into the cooler regions, and is found occasionally on the American coast as far north as Cape Ann. The largest specimens grow to be six feet or more in length, and weigh from 800 to 1,200 pounds. The leatherback feeds on lobsters; crabs, shrimps, jellyfish, and other marine prey. Its own flesh is not eaten by man, as it has a disagreeable flavor and is reputed to cause sickness. Leatherbacks appear in large numbers on the Tortugas Islands off the coast of Florida during the breeding season. Sometimes more than 1,000 turtle eggs are found in one spot, where several females have deposited their eggs together. After they are hatched by the heat of the sun, the little turtles seek the water.

The *green turtle*, so called from the color of its fat, is notable in that it feeds on vegetable matter, whence its flesh is edible and well flavored. This is the turtle that is used for making the famous turtle soup of Lord Mayors' banquets and epicurean menus. It is distributed through all warm seas, and sometimes wanders as far north as Long Island. Very large specimens weigh as much as 500 pounds, but much smaller ones are usually seen in the markets.

The *hawksbill* is a small sea turtle from whose carapace our so-called *tortoise shell* (see below) is obtained. Another well-known sea turtle is the *loggerhead*, which has edible flesh of less desirable flavor than that of the green turtle. The eggs of these turtles are extensively used as food. L.H.

Tortoise Shell, a beautiful, partly transparent substance used in inlay work and in making combs, boxes, buttons, spectacle rims, and various ornamental objects. It is obtained from the horny plates covering the carapace of the hawksbill turtle.

The plates are so thin that it is necessary to weld a number together, and this is accomplished by heating them in oil or boiling them in water. By this process, they become soft, and can then be joined together through heat and pressure, and molded into desired forms. Genuine tortoise shell is very expensive, and is imitated in horn and celluloid. It takes a high polish, and is marketed in various shades of brown, variegated with patches of clear, amber yellow. L.H.

Classification. The order *Chelonia* is divided into two suborders, as follows: *Athecae*, the leatherback; and *Thecophora*, all other turtles. The snapping turtles compose the family *Chelydridae*; the musk turtles, *Cinosternidae*. The terrapins described in this article, the box turtles, and the land tortoises belong to *Testudinidae*. The leatherback belongs to the family *Sphargidae*; all other sea turtles to *Cheloniidae*.

TURTLEDOVE, one of several species of small doves found in the Old World. They usually nest in temperate regions and migrate

in winter to warm latitudes. In spring, their call is a plaintive cooing note. The turtledove of Europe is a bird of ashen plumage, tinged with wine-red. It inhabits woods and plantations, and feeds on seeds and grain. Being



THE TURTLEDOVE

shy, it is seldom seen. Its nest is loosely built and placed in a low tree or hedge. The eggs are creamy white in color and two in number. Two broods are reared in a season. The turtledove of the Scripture is supposed to be a species abundant in Asia Minor and eastward.

The similar North American species is known as the *mourning dove*. It is widely distributed from Canada to Mexico. See DOVE; PIGEON. D.L.

Scientific Name. Turtledoves belong to the family *Columbidae*. The European species is *Turtur communis*.

TURTLE MOUNTAINS. See NORTH DAKOTA (The Land).

TUSCALOOSA, ALA. See ALABAMA (back of map).

TUSCANY, a territorial division, including nine provinces, on the west coast of Italy, distinguished as a center of art and learning, and notable for its historical associations. Tuscany lies along the Mediterranean Sea, north of the province of Rome. It is almost identical, geographically, with Etruria (which see), home of the ancient Etruscans, whose history dates from the eleventh century B.C.

The people of Tuscany have retained their distinctive provincial characteristics, and their language, nobly used by Dante and Petrarch, became the literary vehicle of standard Italian writers. Tuscan peasants are among the most prosperous in Europe, and the industries flourish as well as agriculture. There are cotton, wool, and silk manufactures, and much furniture is produced; also straw hats, noted the world over as "Leghorns." The famous Carrara marble is quarried in Tuscany.

TUSCARORA, *tus kah ro' rah*, an Indian tribe of Southeastern United States. See **INDIANS**, **AMERICAN** (Most Important Tribes).

TUSCARORA DEEP, a sea-bed off the east coast of Japan, exceeding five miles in depth. See **OCEAN** (Bed); **JAPAN** (Physical Features).

TUSKEGEE NORMAL AND INDUSTRIAL INSTITUTE, the most famous school in the United States, and probably in the world, for the education of the negro race. It was founded by Booker T. Washington at Tuskegee, Ala., in 1881, by act of the state legislature, and was opened on July 4. It is described in the article **ALABAMA** (Education); see, also, **NEGRO**.

In 1931 the golden jubilee was celebrated. President Hoover in a radio address recounted the progress of the negro race during the half-century since the school opened. As reported by the Associated Press, the President said:

"The race has multiplied its wealth more than 130 times, has reduced its death-rate by one-half. It has risen to the ownership of more than 750,000 homes; has accumulated property to the value of billions; has developed a far-reaching internal network of social, religious, and economic organizations for the continued advancement of its people; has produced leadership in all walks of life that for faith, courage, devotion, and patriotic loyalty ranks with all the other groups in our country."

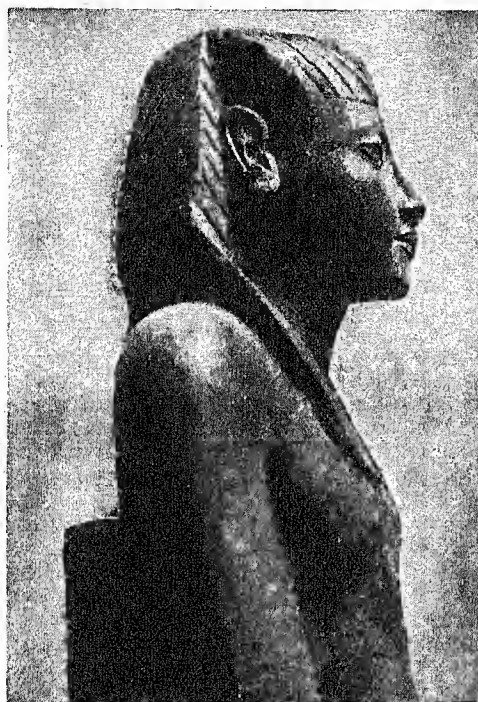
TUSSOCK, *tus' uk*, **MOTH**, the common name of a family of moths whose caterpillars have hair growing in tufts (tussocks) along the back. The hair tufts are often gaily colored, and the caterpillars may have conspicuous stripes on the back. The moths, however, are dull-colored, shades of gray being common.

There are about twenty kinds in the United States. The *gypsy* and *brown-tail* moths (imported from Europe) have been very destructive

to trees in New England. Another species common in Eastern United States is the *white-marked* moth, the male of which is small and inconspicuous, and the female wingless. The larvae of tussock moths eat the soft parts of leaves until only the skeleton remains; they devastate whole orchards and ruin shade trees and forest trees; that is why we have to fight them. W.J.S.

Scientific Names. The scientific name of the family is *Lymantriidae*. The gypsy moth is *Portheiria dispar*; the brown-tail is *Euproctis chrysorrhoea*.

Related Subjects. Under the heading **GYPSY MOTH** and **BROWN-TAIL MOTH** the reader will find pictures and descriptions of these two important species.



KING TUTANKHAMEN

Below, the present resting place of the body of Tutankhamen is in the Museum of Cairo; it lies bereft of the marvelous treasures which aroused the admiration of the world when his tomb was opened. Above, a profile of the statue of the king; this statue has been in the Museum of Cairo for many years.

TUTANKHAMEN, *tut ahnh' ah' men*, king of Egypt, twelfth ruler of the eighteenth dynasty, who lived about 1370-1350 B.C. After



Photos: U & U; O R O

3,300 years, his tomb was opened on November 29, 1922, by Howard Carter, British Egyptologist, and the Earl of Carnarvon. Carter, financed from 1906 by Lord Carnarvon, had searched many years for the tomb whose glories are described in ancient records. In the fall of 1922, he found it under the tomb of Rameses VI, near Thebes, in the desolate little Valley of the Kings' Tombs.

The tomb is of great significance to archaeologists, for Tutankhamen, though unimportant himself, was heir to the accumulated riches of those mighty Pharaohs who first made Egypt a world empire, and his is the only royal tomb yet found that had not been plundered by robbers since ancient times.

The king was about twenty years old when he died, and had been ruling at least nine years. He was the son-in-law of Amenhotep IV, or Ikhnaton, the first monotheist recorded in history. Amenhotep, a dreamer and an idealist, overthrew the orthodox state religion of Amon to worship the One God, who, he believed, was made manifest through the rays of the sun, Aton. He accordingly changed his name from Amenhotep to Akhenaton, or Ikhnaton. Tutankhamen was at first a worshiper of Aton, for the symbol of that religion, and his earlier name, Tutankhaton, are found on the throne in his tomb. When he became ruler (about 1358 B.C.), the powerful Amonite priesthood forced him to readopt the old worship. This changing of the king's name and religion is highly significant for it shows the tremendous power which the ecclesiastical organizations exercised in state affairs.

The tomb itself is the richest ever discovered. In art, it has far increased our knowledge of the culmination of Egyptian civilization. In religion, it has recreated the world's earliest achievement of spiritual and artistic freedom. Many thousand articles of priceless value have been taken out, most of which were kept by the Egyptian government; ultimately, some of these will become the property of great museums. See *ARCHAEOLOGY; EGYPT*. W.H.D.

TUTUILA, *too too e' lah*. See *SAMOA*.

TWAIN, MARK, pen name of a great American humorist. See *CLEMENS, SAMUEL LANGHORNE*.

TWEED, a rough, rather coarse, woolen fabric which originated in Scotland and gained immediate popularity because it offered a variation from the plain-colored and even-textured broadcloth used almost exclusively for men's suiting. The best quality tweeds are made entirely of wool. In inferior kinds, mixtures of cotton and shoddy are introduced (see *SHODDY*). Plain, twill, or herringbone twill are the principal weaves, and the colors were originally inspired by the heather and grasses characteristic of the Scottish moors. Two-ply yarns are used in both warp and woof, although there may be

variations often resulting in a novel design. Tweed is a very durable fabric, and it is suitable for both men's and women's apparel, especially for outdoor and sports-wear.

At first these fabrics were called twills, and pronounced "tweels" by the Scotch people. There are many and varied tales to account for the word "tweeds." Some authorities, probably erroneously, attribute the name to the River Tweed in Scotland, near which the best tweeds are made. Other explanations contain plausible stories of how the word "tweels" was misread for "tweeds." Fine tweeds are manufactured in the United States.

TWEED, WILLIAM MARCY (1823-1878), an American politician whose power of leadership was used in directing one of the grossest schemes of public robbery ever known. He was born in New York City and received a grammar school education. He entered political life at an early age and became the first "boss" of Tammany Hall (see *TAMMANY SOCIETY*). While commissioner of public works of New York City, a state senator, and political boss of both city and state, he organized the notorious "Tweed Ring." Through city improvement schemes its members stole millions of dollars. Tweed was finally sent to jail, escaped to Cuba and thence to Spain, but was returned by the Spanish government in 1876, once more imprisoned, and died in jail. Thomas Nast, the famous cartoonist (which see), made a series of political caricatures of the "ring."



Photo: Brown Bros.

WILLIAM M. TWEED

TWEEDE KAMER. See *NETHERLANDS, THE (Government)*.

TWEED RIVER. See *SCOTLAND*.

TWEEDSMUIR, JOHN BUCHAN, first Baron, (1875-1940), British statesman and author, was born in Perth, Scotland, of an old border family. He was educated at Glasgow University and Brasenose College, Oxford. He was a member of the Headquarters Staff of the British Army in France from 1916 to 1917 and Director of Information for the succeeding year. In 1927 he was elected to Parliament. In 1933 and 1934 he was Lord High Commissioner to the Church of Scotland, and from 1935 to 1940 Governor-General of Canada (which see).

His works include poems, essays, a World War history, *Greenmantle*, *Witchwood*, *The Life of Cromwell*, and *The King's Grace*, a Silver Jubilee book.

TWELVE GREAT PAINTINGS. See *PAINTING*, subhead.

TWELFTH NIGHT, a delightful comedy by William Shakespeare (which see), so named because it was first performed on the twelfth night after Christmas, when the religious feast of the Epiphany (which see) was observed.

TWELVE LABORS OF HERCULES. See **HERCULES**, subhead.

TWELVE TABLES, LAWS OF THE, the first written laws of the Romans, drawn up by ten men known as *decemvirs*, in 452 B.C., on demand of the plebeians, who had suffered by the unjust decisions of patrician judges. These laws were based on the former unwritten code, and on the report of a commission sent to study the laws of Greece. They were written on twelve brass tables, and fastened to the orator's platform in the Forum. For centuries they formed the base of all legislation. See **ROME** (Written Laws).

TWILIGHT, a period between "the dark and the daylight," occurring immediately after the sun has sunk beneath the horizon. At this time, the atmosphere is illuminated by a soft, mellow light that gradually fades into darkness. A corresponding period early in the morning is called *dawn*, but technically it also is twilight. The phenomenon of twilight is due to refraction and reflection of the sun's rays. When the sun sinks from sight, or is about to appear above the horizon, the rays, on passing from the ether into the atmosphere surrounding the earth, are bent at an angle and continue to reach those regions from which the sun itself cannot be seen. They are made visible to the observer because they are reflected by dust and water vapor in the upper air.

The duration of twilight varies greatly in different parts of the earth. This is due to the same causes which affect the length of day and night. It is widely believed that complete darkness follows immediately on the disappearance of the sun in the tropics, but this is not strictly true. Even at the equator, twilight lasts about an hour. It has been found that twilight lasts from the time the sun sets until it is eighteen degrees below the horizon, and in the morning, from the time it is the same distance below the line of vision until it rises. At the equator, the path described by the sun across the earth's surface scarcely varies; similarly, the length of time it takes the sun to drop eighteen degrees below the horizon does not vary. But as one travels north or south, one enters zones where the path of the sun across the earth's surface changes from day to day, and thus it follows that the length of twilight varies. During the Arctic summer, there is a period when the sun never drops beneath the horizon—where summer means perpetual day. Farther south, the summer sun never drops as much as eighteen degrees below the horizon, so that twilight bridges the period between sunset and sunrise. R.H.W.

TWILIGHT OF THE GODS. See **MYTHOLOGY** (Myths of Sin and Punishment: Norse).

TWILIGHT SLEEP. See **ANESTHETIC** (Local Anesthesia).

TWILL, a woven fabric with the warp raised one thread and depressed two or more threads to give passage to the weft, which gives the cloth its appearance of diagonal lines.

TWIN CITIES, popular name of the American cities of Saint Paul and Minneapolis. See **SAINT PAUL** (Minn.); **MINNEAPOLIS** (Minn.).

TWINE, made of the twisted strands of hard fibers, usually sisal or henequen, often mixed with abaca (Manila hemp). Sisal and henequen originated in Yucatan and from there have been introduced into many tropical countries. Abaca is grown only in the Philippine Islands. In manufacture, the raw fibers from the leaves are drawn into slivers. These are combed and spun into twine with about fourteen twists to the foot to hold the fibers tightly together. The twine is first wound on a bobbin and then rewound into a ball. See **SISAL**.

Scientific Names. Sisal is *Agave sisalana*; henequen, *Sisal fourcroydes*; abaca, *Musa textilis*.

TWINFLOWER. See **LINNAEA**.

TWINS. See **QUINTUPLETS**.

TWINS, THE, in astronomy. See **GEMINI**.

TWO GENTLEMEN OF VERONA, a comedy by William Shakespeare (which see).

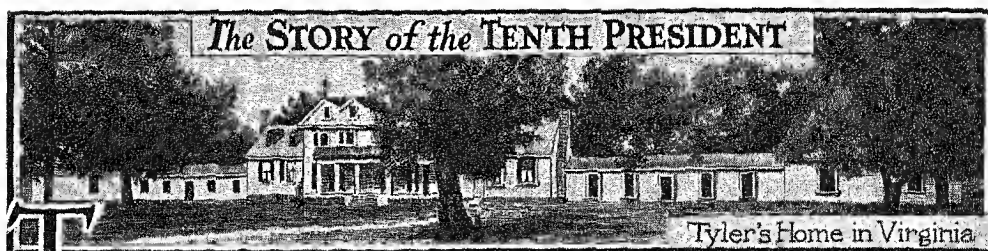
TWO SICILIES, KINGDOM OF THE. See **SICILIES, KINGDOM OF THE TWO**.

TWO-STEP. See **DANCING** (Modern).

TYBURN TREE, a name applied figuratively, in old English street songs and occasionally in literature, to the Middlesex gallows which formerly stood on the bank of the Tyburn, a tributary of the River Thames. This stream crossed London from Hampstead to Westminster, and was a source of the city water supply, but now flows underground and empties through the sewer system. The site of the gallows was near that of the present Marble Arch, the northeast gateway of Hyde Park. As a place of execution, Tyburn was used as early as the twelfth century. There was at first a permanent structure, but this was replaced by a movable gallows about the middle of the eighteenth century. Seats around the gibbet were in great demand when executions occurred, and commanded high prices. It was at Tyburn that Perkin Warbeck (which see) was executed in 1499 and the notorious highwayman Jack Sheppard met his fate in 1742. The remains of Oliver Cromwell were exposed there in 1661, after the Restoration. The last execution on "Tyburn Tree" occurred in 1783, when Newgate prison became the official place of execution in London.

TYCHE, *tí' ke*, the Greek name for the goddess of chance, called Fortuna (which see) by the Romans.

TYCOON. See **SHOGUN**.



TYLER, JOHN (1790-1862), an American statesman, tenth President of the United States. He was elected as Vice-President, with William Henry Harrison as President, but the latter's death in 1841, soon after his inauguration, elevated Tyler to the Presidential chair. He thus was the first man to become President who was not elected to that office. It is a curious fact that this first "accidental President" established precedents which have been followed in some degree by most of the later Presidents who have attained the office in a similar manner. Tyler became President by the votes of a party of which he was not at heart a member, and in his course as President, he acted not according to the demands of that party, but in obedience to the dictates of his own conscience. His independence made his reelection impossible; every succeeding "accidental President," with the exceptions of Roosevelt and Coolidge, also failed to secure a later full term. Throughout his career, independence of thought and action was Tyler's strongest characteristic. He was loyal to principles and ideals; he was loyal to individuals only as they supported his principles or furthered his ideals. Had he been weaker and more easily influenced, his Presidency might have been marked by many achievements. Even under the conditions that existed, it was marked by the Webster-Ashburton Treaty, the admission of Florida to statehood, and the annexation of Texas.

Early Years. John Tyler was born at Greenway, Charles City County, Va., on March 29, 1790. His father, Judge John Tyler, was a distinguished Virginian, who was at various times speaker of the Virginia house of delegates, governor of Virginia, and a judge on the state and Federal benches. After attending John McMurdo's school, young Tyler entered William and Mary College, where he showed a strong interest in ancient history. He was also fond of poetry, and, like another great Virginian, Thomas Jefferson, was an excellent amateur violinist.

At his graduation from college, Tyler was seventeen years old; at nineteen, he began to practice law, and at twenty-one began his public career as a member of the Virginia legislature. In that body he served until 1816; during this period being a conspicuous defender

of President Madison's policies during the War of 1812. Tyler was married in 1813, on the anniversary of his birthday, and a few weeks later he raised a militia company for the defense of Richmond, which was then threatened by the British. Tyler's company, however, did not get into action, and it disbanded after a month.

Political Career. In November, 1816, he was elected to fill a vacancy in the Federal House of Representatives. At the next regular election, when he was chosen for the full term, he received every vote but one cast in Charles City County. In Congress he quickly displayed his characteristic independence. He was a strict constructionist, and he opposed measures, no matter what their origin, which involved a liberal interpretation of the Constitution. Thus he voted against Calhoun's bill providing for internal improvements, opposed a national bankruptcy act, condemned Andrew Jackson's course in Florida, and denounced the Bank of the United States. His course certainly met the approval of his constituents, for in 1819 he was unanimously re-elected, although he had made no effort to influence the voters, except to send them copies of his principal speech against the Bank. In the next Congress, in which the extension of slavery was the chief subject for discussion, Tyler argued that Congress had no right to restrict the extension of slavery, and he voted against the Missouri Compromise; but, at the same time, he insisted that he was personally opposed to the perpetuation of that institution.

In 1821, feeling that his health was impaired, he declined reelection to Congress, and for two years held no public office. In 1823, however, he was again elected to the Virginia legislature, and in the next year was an unsuccessful candidate for the United States Senate. From December, 1825, to the same month of 1827, he was governor of Virginia. At this time political parties in the United States were undergoing a transition. The Democratic party in Virginia became divided into two groups, one of which was led by John Randolph, an ardent supporter of Jackson. The other group, including Tyler, also opposed the policies of Adams's administration, but maintained a certain independence of the Jackson men. In 1827, in fact, the independent Democrats in the Virginia

legislature, with the assistance of the Clay and Adams supporters, elected Tyler to the United States Senate to succeed Randolph.

In the Senate Tyler quickly displayed his strongest characteristic—*independence*. He opposed the "Tariff of Abominations" of 1828, although it was supported by the administration. On the other hand, he voted to confirm Jackson's appointment of Van Buren as minister to Great Britain. He disapproved of nullification and strongly condemned the attitude of Calhoun and South Carolina as both unconstitutional and impolitic, but at the same time he was bitter against Jackson for his coercive policy. In 1833, when the Force Bill came to a vote, some of its opponents in the Senate made it a point to be absent, and others left the chamber while the balloting was in progress. When the vote was recorded, it stood: yeas, thirty-two; nay, John Tyler. He was reelected to the Senate in that year.

In 1834 Tyler again showed his willingness to act independently of his party. Like Jackson, he believed that the Bank of the United States was "the original sin against the Constitution, which, in the progress of our history, has called into existence a numerous progeny of usurpations." Strongly as he disapproved of the Bank, Tyler could not countenance President Jackson's methods of fighting it, and when the President ordered the removal of the government's deposits, Tyler openly broke with the administration. In February, 1834, he proposed to submit a constitutional amendment, either directly forbidding or permitting a national bank, but nothing came of this plan, because Calhoun held aloof.

The course of events during 1834 and 1835 proved beyond doubt that there was a serious split in the Democratic party. Not only had Calhoun and the nullifiers broken away, but the larger body of "States' Rights Whigs" was formed out of anti-Jackson Democrats. The

States' Rights Whigs agreed with the Northern Whigs, or National Republicans, only in their opposition to Jackson, and differed from them on the fundamental issues of the Bank, tariff, and internal improvements. These Southern Whigs in 1836 nominated Hugh White of Tennessee for President and Tyler for Vice-President. Van Buren, however, was elected to the Presidency.

Earlier in the year, Tyler refused to obey instructions from the Virginia legislature to vote in favor of Benton's famous "expunging resolution, wiping out Senate censure of Jackson." Twenty years previously, Tyler had gone on record as to the binding force of such instructions, but he now disregarded them, and resigned from the Senate, February 29, 1836. In 1838 he sat in the Virginia legislature, and in 1839 he was again a candidate for the Senate. The contest was a deadlock, and was never decided, because other events intervened to take Tyler out of the race.

The Presidential Election of 1840. In the meantime, the Van Buren administration had fallen upon evil times, in consequence of the panic of 1837. This panic was attributed, at least in part with justice, to Jackson, Van Buren's old chief, and Van Buren's administration was the chief sufferer. In the election of 1840, the opposition elements sank their differences of policy, declined to adopt a platform, and nominated General William Henry Harrison, a popular hero since the Battle of Tippecanoe (see WAR OF 1812). To win the votes of discontented Democrats, the Whigs nominated Tyler for Vice-President. The campaign was a continuous, almost hysterical, uproar, and, as John Fiske says, was marked by "a more liberal use of claptrap" than any other Presidential contest in our history. Harrison and Tyler ("Tippecanoe and Tyler too") were elected, receiving 234 electoral votes out of a total of 294.

The Administration of John Tyler

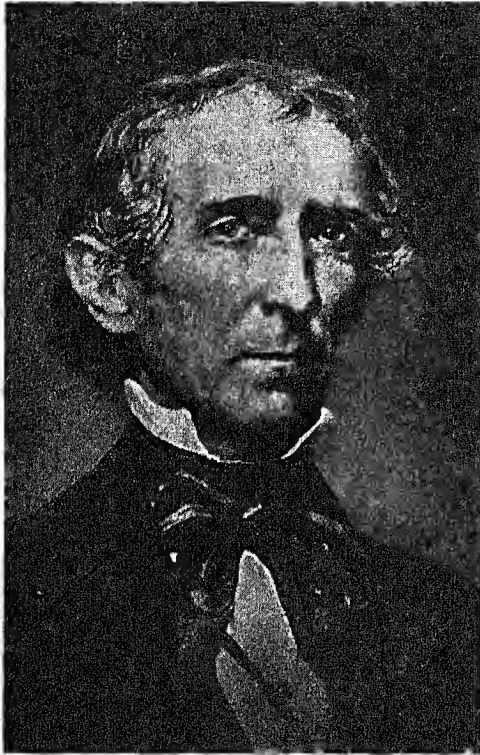
The inauguration of Harrison and Tyler was scarcely over before Clay showed clearly that he regarded the election as a victory for himself and the political principles for which he stood. Tyler, on the other hand, claimed to see in it nothing more than a stinging rebuke to the "corrupt and tyrannical" party led by Jackson and Van Buren. When, therefore, President Harrison's death within one month, on April 4, 1841, made Tyler President, the situation showed possibilities of strife.

When Congress met on May 31, 1841, nearly two months after Harrison's death, the Whigs had a majority in both houses. In his opening message, President Tyler reviewed the history of the Bank of the United States and other financial plans, and closed as follows:

I shall be ready to concur with you in the adoption of such system as you may propose, reserving to myself the ultimate power of rejecting any measure which may, in my view of it, conflict with the Constitution or otherwise jeopard the prosperity of the country, a power which I could not part with, even if I would, but which I will not believe any act of yours will call into requisition.

Congress, however, chose to ignore this poorly concealed threat, and after abolishing Van Buren's subtreasury system, proposed to reestablish the Bank of the United States. The President approved the former step, but vetoed the bill to reestablish the Bank, for the reason which he had often stated, that Congress had no right to establish a corporation whose headquarters or branches should operate in the

states, unless the states individually gave their consent. Even before the passage of the bill, there were attempts by the Whig leaders to get some "private compromise" which Tyler would approve, but the President declined to heed these advances. After the veto of the bill, a new bill was drafted, in a form which it



JOHN TYLER

Photo: U & U

was said the President could approve. Efforts were made to bully the President to sign the second bill. Clay, for example, wanted to know why the President did not follow his precedent in 1836, when he resigned from the Senate, and now resign the Presidency if he had scruples which "again hindered him from obeying the will of the people."

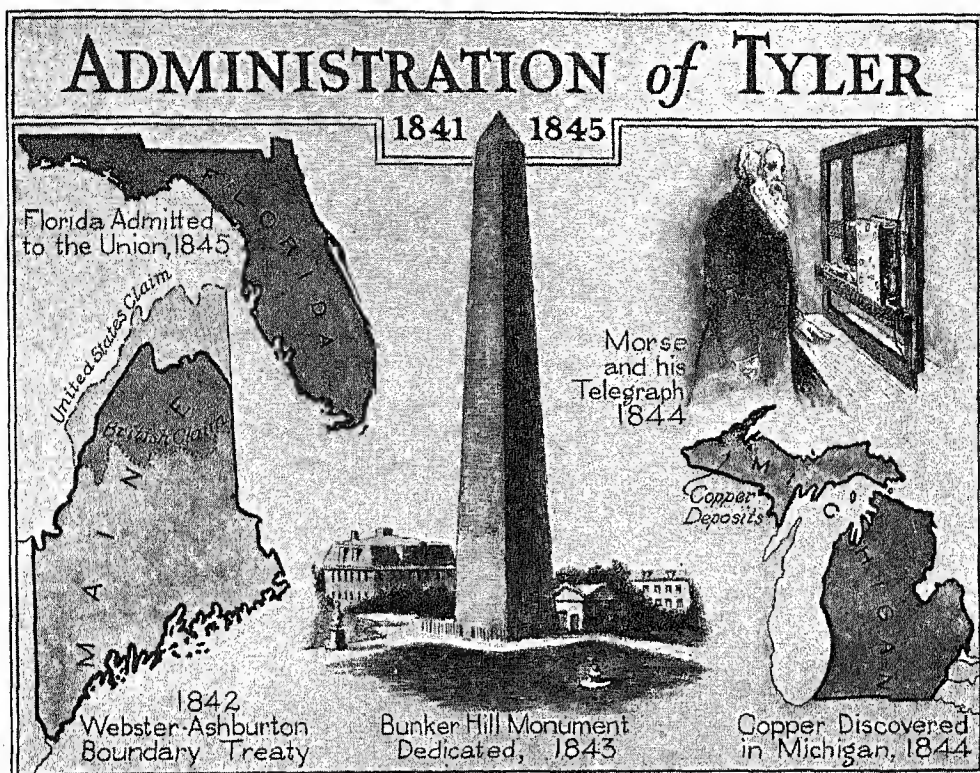
Tyler, however, was unmoved, and on September 9, 1841, five days after the passage of the second bill, returned it to Congress with his veto message. On the 11th, all the members of the Cabinet except Daniel Webster, Secretary of State, resigned. Webster seems to have been influenced by a double motive: first, he wanted to conclude the negotiations which soon led to the Webster-Ashburton Treaty; and second, he was farsighted enough to see that Clay, his great rival, would receive all the benefit from a Whig victory over Tyler. The majority of the Whigs now refused to recognize Tyler as one of their party, but a

handful—which became known as "the corporal's guard"—continued to acknowledge his leadership.

The Democrats now came to Tyler's support, and the elections of 1842 gave them a majority in Congress of sixty-one, in place of the former Whig majority of twenty-five. The popular sentiment, too, as the shadow of the panic of 1837 receded, showed a reaction in favor of the President. So strong was this reaction that, in 1844, the Whig platform did not even mention the Bank of the United States. In the meantime, the Whigs, in 1842, attempted to pass a protective-tariff bill, which provided for a distribution among the states of the surplus which these duties would create. Tyler vetoed the bill, chiefly because of this clause. Then Congress passed the bill without the clause, and the President signed it. One other question, involving internal improvements, divided the Whigs and Tyler. In 1844 Congress passed two so-called river-and-harbor bills, one for the Eastern states and one for the Western. The former Tyler vetoed, but the latter he signed, because the Mississippi River, whose improvement was the principal object of the bill, was a "great common highway for the commerce of the whole country."

Boundary Problems and Annexation. On the north and south, the boundaries of the United States had not been satisfactorily determined. The Webster-Ashburton Treaty of 1842 finally ended one source of dispute with Great Britain, but the Oregon question was left for Tyler's successor to handle. A third problem, Texas, was settled in the closing days of Tyler's term. Texas had won its independence from Mexico in 1836. The majority of its citizens were natives of the United States, and from a national standpoint, the annexation of Texas was desirable in every way. The opposition to annexation came from the Northern Whigs, who succeeded in rejecting the annexation treaty which the administration negotiated with Texas in 1844. After the election of 1844, however, the opposition weakened, and a joint resolution of both Houses of Congress, offering statehood to Texas, was signed by Tyler on March 3, 1845. On the next day, Polk became President.

Election of 1844. Tyler and the Whigs parted company long before the election of 1844. At the same time, the division between the Democratic factions continued, with the result that neither Tyler nor Van Buren was strong enough to win the Democratic nomination. It went to James K. Polk. Another factional convention, however, nominated Tyler. He accepted the nomination, but later withdrew his name when the regular Democrats appealed to him in the interests of the party, and formally urged him to return to the fold.



Miscellaneous Items of Interest. Two events of far-reaching importance took place during Tyler's term. One was the construction of the first successful telegraph line, in 1844; the other was the discovery of copper in Michigan, in the same year. Dorr's Rebellion (1842) in Rhode Island, the Patroon War in New York, the difficulties of the Mormons at Nauvoo, the dedication of Bunker Hill Monument (1843), and the admission of Florida to the Union (1845) are other important events which are discussed elsewhere in these volumes. Fremont's explorations in Colorado in 1842 to 1844; the establishment (1845) of the *True American*, an abolitionist journal, at Lexington, Ky.; and the foundation of "Brook Farm," near Boston, must also be mentioned.

Tyler and the Confederacy. At the close of his term, President Tyler retired to an estate which he bought, three miles from Greenway, Va., his birthplace. There he lived quietly until the threat of war called him to action in 1861. In a letter to the *Richmond Enquirer*, January 17, 1861, he recommended a convention of the border states, to devise some adjustment for the difficulties caused by the secession of South Carolina. Such a convention was held at Washington in February, and Tyler was chosen as its president. When the Congress of the United States rejected the

resolutions adopted by the convention, Tyler abandoned further efforts. The next day, in the Virginia state convention, he advocated immediate secession. In May, 1861, he was elected to the provisional Congress of the Confederacy, and in the autumn was elected to the permanent Congress. Before he had taken his seat, he died at Richmond, on January 18, 1862. He was buried in Hollywood Cemetery, Richmond, his grave being about thirty feet from that of James Monroe. The grave remained unmarked for more than half a century, but in 1914 Congress appropriated \$10,000 to erect a suitable monument. E.D.F.

Letitia Christian Tyler (1790-1842), the daughter of a wealthy Virginia planter, was married to John Tyler, son of Virginia's governor, in 1813, when he was entering upon his public career. Nearly thirty years of ideal family life and happiness followed, broken only by the loss of two of her seven children and her own ill health.



Photo: U & U

LETITIA TYLER

OUTLINE AND QUESTIONS ON JOHN TYLER

Outline

I. Early Years

- (1) Birth and parentage
- (2) Education
- (3) Law study
- (4) Marriage

II. Public Life

- (1) In Virginia legislature
 - (a) Defense of Madison's policies
- (2) In House of Representatives
 - (a) Independence of thought and action
 - (b) Attitude toward the Bank of the United States
 - (c) Attitude toward extension of slavery
- (3) As governor of Virginia
- (4) In United States Senate
 - (a) Attitude on important questions
 - (b) Break with the administration
 - (c) Split in Democratic party
- (5) Nominated as Vice-President, but defeated
- (6) Presidential campaign of 1840
 - (a) Candidates
 - (b) Issues
 - (c) Character of campaign
 - (d) Results—Harrison and Tyler elected
- (2) Warning to Congress
- (3) Quarrel with Whigs
 - (a) Causes
 - (b) Results—resignation of Cabinet
- (4) Legislation
 - (a) Tariff of 1842
 1. Concession necessary
 - (b) River-and-harbor bills
- (5) Boundary question
 - (a) Webster-Ashburton Treaty
- (6) Texas questions
 - (a) Opposition of Northern Whigs to annexation
 - (b) Treaty of 1844
 - (c) Annexation
- (7) Internal affairs
 - (a) Construction of telegraph
 - (b) Dorr's Rebellion
 - (c) Patroon War
 - (d) Mormon troubles
 - (e) Bunker Hill Monument dedicated
 - (f) Admission of Florida
 - (g) Fremont's Colorado explorations
 - (h) Brook Farm established

III. Administration

- (1) Death of Harrison and elevation of Tyler to Presidency

IV. Relation to Confederacy

- (1) Convention for adjustment
 - (a) Rejection by Congress of resolutions
- (2) Secession of Virginia
- (3) Tyler elected to Congress of Confederacy

Questions

Show from Tyler's policy in the House of Representatives, in the Senate, and in the Presidency that his dominant characteristic was independence.

How many "accidental Presidents" were there before Tyler? How many have there been since?

What was Tyler's attitude toward slavery? Why did he vote against the Missouri Compromise?

When did he stand alone in the Senate in his vote on an important question?

What did Tyler consider the "original sin against the Constitution," and why?

How did a noted historian characterize the campaign in which Tyler was elected to the Vice-Presidency?

In what light did Tyler look upon his own election?

What was his "poorly concealed threat" against Congress, and how did that body receive it?

What great statesman suggested that Tyler resign the Presidency? What were the circumstances that made possible such a suggestion?

What do these words suggest: Brook Farm; Patroon system; Fremont; Dorr's Rebellion; Nauvoo?

After he left the Presidency, what political activities occupied Tyler?

What important events occurred in the closing days of Tyler's administration?

Under what circumstances was Texas admitted to the Union?

What disputes were settled by the Webster-Ashburton Treaty?

Mrs. Robert Tyler, wife of the President's son, acted as hostess in the White House during Letitia Tyler's ill health and after her death. Elizabeth Tyler married William Waller in 1842, in the White House.

Julia Gardiner Tyler (1820-1889). No other President had been married while in office, and Tyler's marriage with Miss Julia Gardiner, in 1844, aroused much public interest. The bride was a member of the old New York family which owned Gardiner's Island, near Easthampton. She met the President while visiting in Washington with her father. Mr. Gardiner's tragic death, with other members of a pleasure party, when a cannon on a warship in the Potomac exploded, again attracted to her the attention of the President. Mrs. Tyler presided over the White House for eight months, and then retired with her husband to his Virginia home.

Related Subjects. The reader who desires additional information respecting events connected with the life and times of this President is referred in these volumes to the following articles:

Bank of the United States	Missouri Compromise Nullification
Clay, Henry	Patron System
Dorr's Rebellion	States' Rights
Florida (History)	Texas (History)
Harrison, William Henry	Webster-Ashburton Treaty
Jackson, Andrew	

TYLER, TEX. See TEXAS (back of map).

TYLER, WAT. See WAT TYLER'S REBELLION.

TYMPANIC, *tim pan' ik*, MEMBRANE. See EAR (External Ear).

TYNDALE, *tin' dal*, WILLIAM (about 1484-1536), an English translator of the New Testament and the Pentateuch, was born on the Welsh border, probably in Gloucestershire. He was educated at Oxford and Cambridge, where he gave special attention to theology, and later was ordained. Before 1522, he became chaplain and tutor in a family of rank in Gloucestershire, and employed his leisure in preaching in the surrounding villages. His views so aroused the antagonism of the clergy that he was brought before the chancellor of the diocese as a suspected heretic. When allowed to depart, he determined to translate the New Testament into English, that it might enlighten the people. To one of his opponents he said, "If God spare my life, ere many years I will cause a boy that driveth the plough shall know more of the Scripture than thou dost."

In 1524 he visited Luther at Wittenberg, and then went on to Cologne, where he endeavored to have his translation printed. The work was discovered, and the authorities of Cologne commanded the printers not to proceed with it; but in 1526 Tyndale succeeded in getting an octavo edition of the New Testament printed at Worms and in smuggling copies into England, with subsequent editions. About 1529, Tyndale rejected Luther's doctrine of the real, sacramental presence of Christ in the Lord's Supper, as well as the doctrine even of Christ's mere spiritual

presence. He looked upon the sacrament as a commemorative act only.

Because Tyndale, in writings printed at Marburg in Hesse, strongly opposed the divorce of Henry VIII from Catharine of Aragon, Henry had him arrested and confined for sixteen months in the state prison of the Low Countries, near Brussels. In spite of strenuous efforts in his behalf, he was tried for heresy, convicted, and strangled, and his body was burned at the stake, August 6, 1536. He ranks among the most remarkable leaders of the Reformation, but his fame rests chiefly on his translation of the New Testament. L.F.G.

His Works. Besides the New Testament translation, Tyndale wrote the *Parable of the Wicked Mammon*, *The Obedience of a Christian Man*, and *How Christian Rulers Ought to Govern*. He translated the Pentateuch (1530) and the book of *Jonah*, and, during his imprisonment, the other Old Testament books as far as *Chronicles*. All of these translations were published as *Matthew's Bible*, in 1537.

TYNDALL, *tin' dal*, JOHN (1820-1893), a British natural philosopher and one of the world's greatest physicists, was born in County Carlow, Ireland. Chiefly a self-made man, with only a common-school education in his youth, he gained his early scientific experience in the Irish and English ordnance surveys and in railway engineering. After two years at the University of Marburg, Tyndall received his doctor's degree, gained by intense study, and rose rapidly to eminence. His early investigation in magnetism resulted in his election in 1852 as Fellow of the Royal Society. In 1854 the Royal Institution made him professor of natural philosophy, a colleague of Faraday, and appointed him director on the latter's death. As scientific adviser to Trinity House and the Board of Trade, he carried out many experiments.

Tyndall yielded to the fascination of mountain-climbing in Switzerland, and as a result became engrossed in elaborating a theory of the flow of glaciers—a theory which brought him in direct conflict with other scientists. His chief scientific labors, however, are connected with the study of radiant heat, its transmission and radiation, and its absorption by vapors and gases. Other experiments with pure air led to improved methods of sterilization. In 1872-1873, he lectured in America, and generously donated the large proceeds of his tour to the cause of American science.

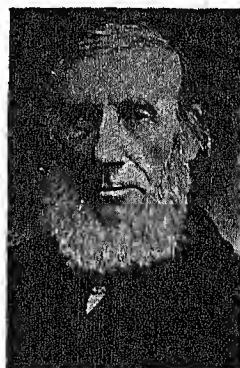


Photo: Brown Bros.

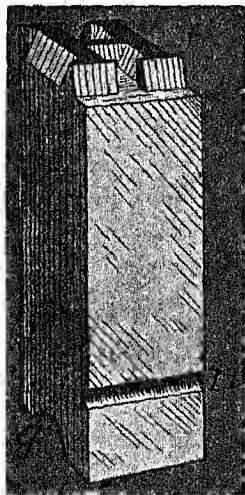
JOHN TYNDALL

Great and permanent as are his scientific contributions, the personality of the man himself assures for him a surer and more permanent regard in the mind of posterity. First he observed and explored nature, and then set himself to expressing his knowledge in the most forceful, vivid manner possible. Though he earnestly pursued science for its own sake, he was equally bent on making it popular, on bringing it within the understanding of common men. His name, with those of Darwin and of his friend Huxley, is permanently connected with the endeavor to establish the new standpoint of science as a part of modern philosophy.

Tyndall's Books. His principal works include *Faraday as a Discoverer*; *Heat as a Mode of Motion*; *The Forms of Water*; *Lectures on Light*; *On Sound*; *Diamagnetism and Magne-crystalline Action*; *Contributions to Molecular Physics in the Domain of Radiant Heat*; *The Glaciers of the Alps*; *Hours of Exercise in the Alps*; and *Fragments of Science for Unscientific People*.

TYPE, a raised letter or character cast in metal or carved in wood, and used in printing. Printers once carved their own type from blocks of wood, and later cast them in metal, but type-

foundry is now an important industry, and printers buy their type. Newspapers and magazines are printed from type that is separately cast for each issue and at once melted down (see **LINE TYPE**). The type commonly found in printing establishments is a slender, rectangular block of metal ninety-two hundredths of an inch high, carrying a raised letter or other character on its top, or face. A nick on one surface indicates how the type should be set, a groove along the bottom allows the type to stand on two



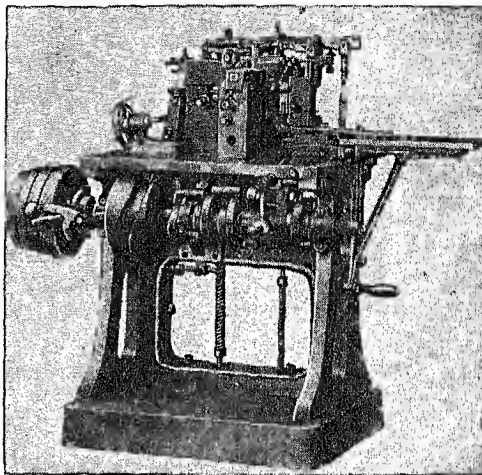
FORM OF TYPE

Explanation appears in the text.

feet and gives it more steadiness. In the figure, *f* is the face, *n* the nick, and *g* the groove.

Founding. The first step in casting type is to shape a model of the letter desired. This model, or die, is of steel, and when it has been finished, the workman stamps it into soft copper, leaving an impress of the letter. This soft copper becomes then the mother type, or *matrix*, from which an indefinite number can be struck off. The matrix is placed in a mold having the shape and size of the finished type, and melted type metal is run in and allowed to harden, much as bullets were molded in

pioneer days. Founding was once done wholly by hand, but machines now make it possible to cast 140 or more pieces of type in a minute. The metal used is an alloy of lead and antimony, with a little copper and tin added.



A TYPE-CASTING MACHINE

A complete assortment of type of any given size is called a *font*. The weight of a font varies with the kind of printing to be done, and has a range of from about one pound to 500 pounds or more. The printer arranges his type for convenience into upper and lower cases. The upper case contains compartments for the capital letters, small capitals, and signs, and in the lower case, the small letters, figures, and spaces are kept. Some letters are used in writing much more frequently than others; *z*, for example, occurs much less frequently than *a* or *e*, and, accordingly, a font will contain many more *a*'s and *e*'s than *z*'s.

Size. Thirteen sizes of type are in common use in printing books and newspapers, but the smallest of these sizes are relatively little used. The tendency in recent times has been to increase the size of the type used, in order to avoid needless strain on the eye of the reader. The size of type is indicated either by a special name or by the number of *points* it measures, a point being one-seventy-second of an inch. Modern printers use the term *point* in describing type. Both methods of naming and comparative sizes are shown in the following table:

Pearl	5-point
Agate	5½-point
Nonpareil	6-point
Minion	7-point
Brevier	8-point
Bourgeois	9-point
Long Primer	10-point
Small Pica	11-point
Pica	12-point

There is a smaller type than 5-point in occasional use, called *diamond* ($4\frac{1}{2}$ -point); also larger sizes than pica, including *English* (14-point), *Columbian* (16-point), and *Great Primer* (18-point); and still larger sizes are used, up to 96-point or even 144-point, in setting advertising copy and the so-called "scare heads" for newspaper news of an important or sensational character. See PRINTING.

[The body type used in these volumes is 9-point, formerly called *bourgeois*, while the smaller type used for quotations, scientific classifications, etc. (including this paragraph), is 7-point, formerly called *minion*. The sections headed "Related Subjects" are set in 6-point, or *nonpareil*.]

TYPESETTING MACHINE. See LINOTYPE; MONO-TYPE.

TYPEWRITER.

The modern typewriter is the outgrowth of various crude machines for producing printed characters on paper without the use of movable type. In the year 1874, the first really practicable machine was placed on the American market by E. Remington & Son, a firm engaged in the manufacture of guns, at Ilion, N. Y. The original model of this machine was designed by C. L. Sholes, S. W. Soule, and Carlos Glidden of Milwaukee, Wis., but to Sholes is due the chief honor of perfecting a workable model. Previous to the Sholes model, several designs had appeared in England, but they were not of practical value, and a number of earlier models produced in the United States were disappointing to their inventors.

Once the typewriter had proved its value, its future was assured, and to-day it is indispensable in the business world, in law courts, in government offices, in the military camp, and in almost every field of activity. It has made possible the efficient handling of huge volumes of correspondence, the rapid tabulation of records and reports, and has facilitated the countless other operations carried on in the professional and business world. In this connection, it is interesting to note the part the typewriter has played in bringing women into commercial and professional life. Stenography and typewriting have opened the way into

business to many thousands of women, and in numerous cases a knowledge of these arts has been a stepping-stone to a high-salaried executive position.

The original Remington typewriter was not unlike the standard machines of to-day. It was provided with a number of metal bars, carrying type on one end, and set in pivots about a horizontal ring. The shorter arm of each type bar was attached by a wire to a lever, which ended in a letter in the keyboard of the machine. When the key was struck, the type was lifted so as to strike a single point on a rubber cylinder, called the *platen*. Between the type and the platen, an inked ribbon, wound on spools at either side of the machine, was carried. The platen, mounted on a carriage, was so arranged that it was automatically moved forward one space at each release of the keys. In machines of the present

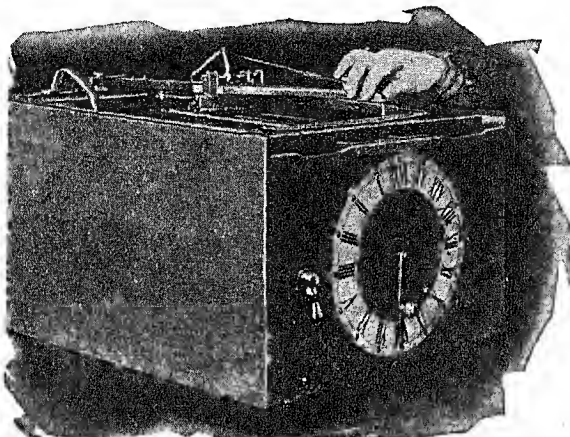
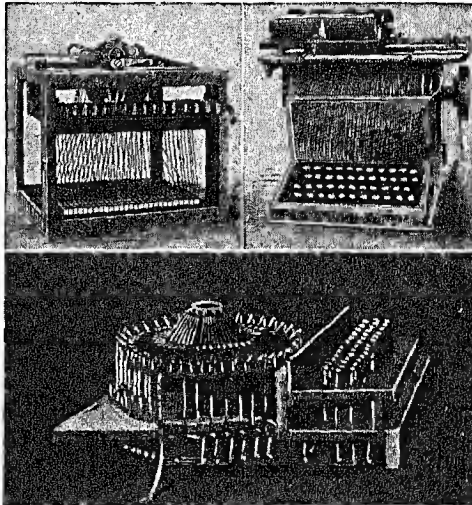


Photo: U & U

FORERUNNER OF THE MODERN TYPEWRITER

The Burt Typographer, patented in 1829, when quill pens were yet in use. This invention entirely lacked the merit of practicability. A replica of the original Burt machine is now in the Smithsonian Institution, Washington, D. C.

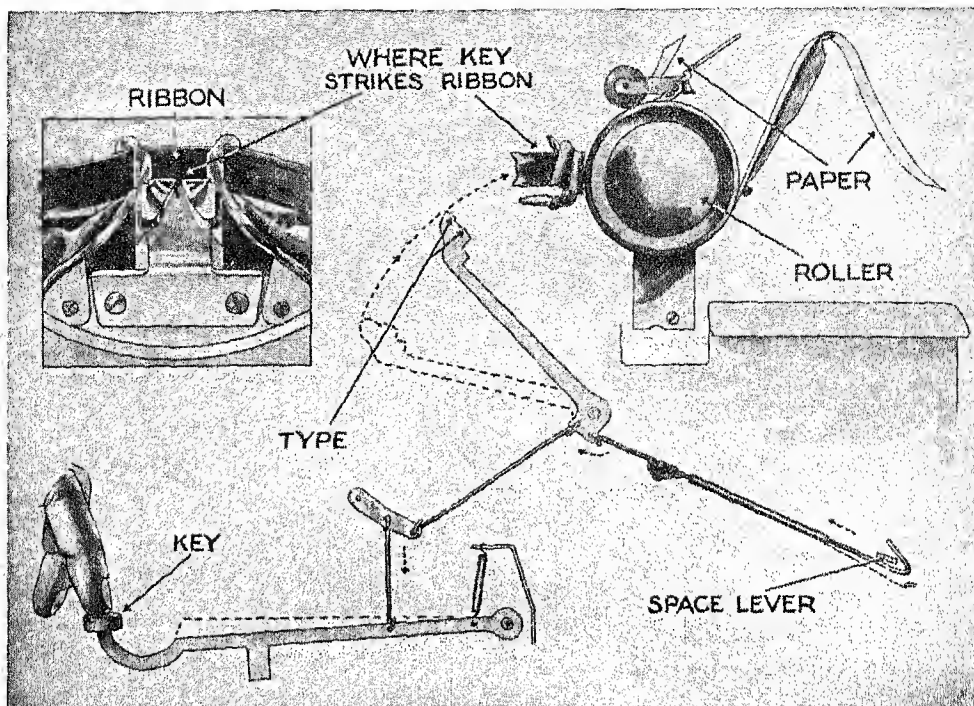
time, the type bars are usually arranged horizontally about an arc of a circle, making possible the so-called "visible" writing. In the



THREE LATER MODELS

Upper left, the early Sholes-Glidden; right, a later Sholes machine. Below, the first Beach typewriter.

In the



OPERATING MECHANISM OF THE MODERN TYPEWRITER

old-style machine, the characters when printed were out of view of the operator.

The first machines had two sets of type bars, one for capital letters and one for small letters. Nearly all modern machines have a single keyboard, and each type bar carries two characters. Capitals are made through the action of a shift key. The keyboard also carries punctuation marks, figures, and various other characters. Other improvements are the bell to warn the operator when the end of the line is nearly reached, the lock to prevent the machine from working after a certain point is passed, the margin release, the back-space lever, the automatic ribbon reverse, and various mechanical devices for such operations as addressing, tabulating, and the like.

Small-size machines, light enough to be carried in a case by hand, are now in wide use. These "portables," as they are called, are a very convenient size for newspaper correspondents, magazine writers, and others who need to carry their typewriters about with them. Another modern development is the so-called "noiseless typewriter," which has a very quiet action, but is more expensive than the ordinary machine, and for that reason is in less general use.

B.M.W.

TYPHOID, *ti' foid*, **FEVER**, an infectious disease characterized by ulceration of the intestinal walls. It is caused by a bacillus iden-

tified in 1880. During the course of an attack, the germs multiply in other organs of the body, notably the spleen, and enlargement of this organ is common. See page 567.

Distribution. Persons contract typhoid fever by drinking contaminated water or milk, and by eating infected food. The disease is not communicated through the breath of a patient. The bowel and kidney discharges of the sick, however, contain countless millions of disease germs, and if the discharges are not properly disinfected or disposed of, they become a source of great danger by infecting sewage, and thus, in many localities, the water supply. House flies alighting on these discharges carry the germs into the home and contaminate the food. Infected milk is not due to the cow, for cattle never have typhoid, but the contamination results from the use of impure water to dilute milk, or from washing utensils in polluted water, or through the handling of milk by unclean persons. There are also a few unfortunate persons known as "carriers," who are immune to attacks themselves, but nevertheless are at all times carrying in the system disease germs which are a constant source of infection.

Prevention. Within recent years, there has been a widespread educational campaign to teach people how to avoid the disease. According to the American Medical Association,

typhoid fever is becoming an almost unknown disease in American cities of more than 100,000 population. In rural towns and in the country, the death rate is higher, because the standards of sanitation are less rigid than in the cities. The New York City Department of Health has issued the following suggestions in regard to avoiding typhoid:

Keep yourself in good health. Do not use alcoholic drinks. Keep your home and your body clean. Always wash your hands before eating. Drink only the best milk; if in doubt, boil it. Drink only pure water; if in doubt, boil it. Eat only pure, good food. Fresh-cooked food is safest; heat kills the germs. Avoid salads, raw vegetables, and raw oysters, unless you know they come from a clean place. Wash ice when it comes, and keep the icebox clean. Do not put ice in drinking water or on food. Deal only with good, clean food stores. Don't eat at dirty restaurants. Keep flies out of your rooms and away from your food. Be careful when you go to the country; be sure of what you eat, and do not drink from a strange spring or stream. Never visit where there is a case of typhoid fever. Be careful about friends who have had typhoid fever; they may be carriers. Where there is an outbreak of typhoid fever, use only boiled water for drinking, and also boil milk just before it is used. If typhoid fever is in your house or neighborhood, or you are exposed to the disease in any way, or are likely to be, have yourself immunized.

A prepared vaccine, administered by hypodermic injections, confers immunity for about three years. That the belligerent armies in Europe were comparatively free from typhoid attacks during the World War was due to the universal application of this vaccine method. During the Boer War, there were more than 20,000 cases among the British troops; from the beginning of the war in Europe, there were fewer than 1,500 cases a year among all the allied forces in France and Belgium.

Symptoms and Treatment. It takes from eight days to two weeks for the fever to manifest itself after the germs have entered the system. The attack comes on gradually; early symptoms are rising temperature, nausea, diminished appetite, headache, pains in the back and limbs, and bleeding at the nose. At the end of a week or so, the patient has a temperature of from 103° to 105°, and sometimes an eruption of a few pink spots on the abdomen. The spots disappear in two or three days, but are followed by others. Cases sometimes end fatally at the end of the second week through hemorrhage (caused by ulcers eating into the blood vessels), or through perforation of the intestine. The fever begins to decline during the third week, the evening temperature being one to three degrees higher than the morning temperature. This is a period of grave danger, because the patient suffers from weakness, tremors of the muscles, delirium, and weakening heart; at this time, death may result from exhaustion. Perforation occurs in from five

to six per cent of cases. In most cases, convalescence begins during the fourth week.

Treatment is mainly along hygienic and dietary lines. It is important that the fever be controlled, and this is done by means of sponging baths or the wet pack. Aside from antiseptics used in intestinal injections, few drugs are used. Liquid food and cool water are important items in the diet. To prevent the spread of the disease, all implements, utensils, and clothing used about the patient must be thoroughly disinfected, and discharges must be either disinfected or burned. W.A.E.

TYPHOON, *ti' foon'*, the local name for violent cyclonic storms which sweep over the Philippine and Japanese islands to the neighboring coast of China every year, during the months of August, September, and October. They originate near the equator, when the Pacific doldrums are farthest north, and, after moving toward the northwest, turn northeast, often doing great damage in Japan. The western Pacific typhoons are usually from 50 to 100 miles in diameter, and while they travel but slowly, in a given direction, the damage is done by the rotating storm within the circle of its extent. Storms of the same nature in the West Indies are called *hurricanes*. R.H.W.

Related Subjects. The following articles in these volumes will be of interest in connection with this discussion of the typhoon:

Cyclone	Monsoon	Whirlwind
Hurricane	Tornado	Wind

TYPHUS, *ti' fús*, **FEVER**, a contagious disease transmitted from person to person by means of lice. It is also known as *jail fever* and *spotted fever*, with reference to its occurrence in prisons, and because of a characteristic eruption that appears in the course of an attack. Typhus fever is little known in the United States, except occasionally in mild form, but cases are reported yearly from South America, Mexico, and from various countries of Asia, where crowded conditions and lack of sanitation prevail. A dreadful epidemic of typhus fever occurred in Serbia in 1914-1915. The American Red Cross Commission supervised a vigorous delousing campaign which wiped out the epidemic, but 150,000 persons died within six months (see below). At that time, considerable study was given to the cause and prevention of the disease.

An attack comes on suddenly, and is manifested by rise of temperature, severe nervous symptoms, rheumatic pains, headache, and rigor of the muscles. About the fifth day of the attack, slightly raised spots appear on the body; at first, these disappear when pressed, but later they become permanent and darker. During the second week, the patient usually becomes delirious, and about the fourteenth day, the attack reaches a crisis. In favorable cases, recovery follows rapidly.



Photo: U & U

The Rugged Beauty of the Tyrol. The scene is on the southern frontier of the Austrian Tyrol, facing south. Swiss, Italian, and Austrian lands meet here among the eastern Alps. (See next page.)

Treatment of typhus victims is mainly along hygienic lines. Patients are isolated and are given clean surroundings, and their clothing is disinfected or sterilized. By this means, lice and eggs are destroyed. Fever, headache, and delirium are controlled by ice packs, baths, and certain drugs are administered which act as stimulants and laxatives. One attack usually immunizes the victim.

Delousing is the method of protection against typhus, the efficacy of which was established on an enormous scale during World War I. The method is as follows: All persons coming from an infected area must pass through a delousing station. Here they are stripped of all clothing and given a thorough bath. The soap and hot water bath is sometimes preceded by a wiping with kerosene, followed by one with warm vinegar water. Meanwhile, the clothing is sterilized by heat.

Typhus fever became a serious menace in Poland in 1939, when millions of people were forced to live in crowded ghettos and concentration camps. It spread over southeastern Europe, infecting the German armies on the Russian front during World War II. W.A.E.

TYR, the Norse god of war. See TUESDAY.

TYRE. See PHOENICIA (Cities); ALEXANDER THE GREAT.

TYRIAN PURPLE. See PURPLE.

TYROL, OR TIROL, *tir' ol*, before World War I, a crownland of the Austrian Empire, noted for its delightful Alpine scenery. By terms of the Treaty of Saint Germain, effective in July, 1920, Northern Tyrol was retained by Austria, which became a republic, and Southern Tyrol was ceded to Italy.

Austrian Tyrol. The territory left to Austria, constituting a province of the former republic (since 1938, a part of Germany), lies between Vorarlberg on the west and Salzburg on the east. It has an area of 4,882 square miles, and a population of 313,885. Innsbruck, the capital and largest city, is described and illustrated under AUSTRIA (The Cities).

Venezia Tridentina. The section belonging to Italy extends south from the Austrian frontier and eastward from the Swiss border about 100 miles along the Adige River. It is divided into two provinces: Bolzano, in the north, and Trento, in the south. The total area of 5,252 square miles is divided rather evenly between the two sections, Bolzano having an area of 2,831 square miles and Trento covering 2,535 square miles. The entire population totals 669,029 (1936 census).

This section was formerly known as the Italian Tyrol, and was divided into Alto or the Upper Adige in the north, and Trentino in the south.

During the World War, in April, 1915, when Italy was still associated with Austria in the Triple Alliance, the Italian Government de-

manded Trentino and certain territory northward. Austria having refused to cede anything besides Trentino, Italy in May concluded the Treaty of London with the Allies, and entered the war on their side. The peace treaty at the close of the war permitted Italy to annex a section predominantly German. Pledges to protect the racial culture of the Germans were not kept. In 1940, German residents of Bolzano, Trento, Udine, and Belluno voted to go to Germany under a repatriation agreement designed to end a minority problem between the two countries, as the Tyrolean Germans had claimed Reich protection.

Venezia Tridentina possesses some of the most magnificent and picturesque mountain scenery to be found in Europe. The fantastic Dolomites stretch through the country, forming

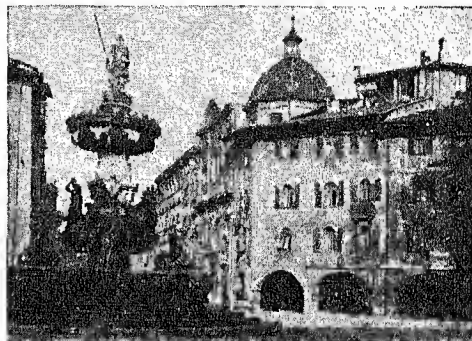


Photo: Bnl

TRENTO, IN VENEZIA TRIDENTINA

a famous winter sports playground, as well as a challenge to summer alpine climbers. The distorted shapes into which the Dolomites are fashioned, the great ridges and deep waterways contrast sharply with green valleys, quiet villages, and roads winding through forest and meadow. There is great geological diversity in the Tyrol. A profusion of mineral springs coupled with a beneficent climate, have made Venezia Tridentina noted for its health resorts. Of these, Cortina, at the junction of four important and beautiful highways, is the most famous. Castles dot the countryside.

Bolzano, the capital city of the province by the same name, is a busy town strategically situated for sports and health seekers. Gries, a suburb, is a well-known spa, consisting entirely of villas and gardens. The city of Trento is the ancient Tridentum, and cherishes many excellent works of art, and imposing buildings. Especially noted are the monument to Dante by Cesare Zocchi, the church of S. Maria Maggiore, the Romanesque Cathedral, and the church of S. Apollinare. See ITALY; page 7342.

TYRTAEUS, *tur te' us*. See MUSIC (The Place of Music in Life).